APPENDIX 8

STREAM AND WETLAND SECONDARY IMPACTS, PREDEVELOPMENT VS. POSTDEVELOPMENT COMPARISON

DATED MARCH 13, 2020

Draper Aden Associates
Engineering • Surveying • Environmental Services

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March 13, 2020

Mr. Brent E. Johnson, Vice President
Koontz, Bryant, Johnson, Williams
11901 Old Stage Road
Chester, VA 23836

RE: Stream and Wetland Secondary Impacts
Predevelopment vs. Postdevelopment Comparison
Green Ridge Landfill Project
Project No. R018020117-040102

Dear Brent:

Draper Aden Associates prepared this letter report to assist in evaluating secondary impacts to streams and wetlands downstream of the proposed Green Ridge Landfill. The letter report summarizes calculations for the pre- and postdevelopment stormwater drainage areas where sediment basins are anticipated to be placed around the perimeter of the landfill. The predevelopment volumetric flows from the 1-, 2- and 10-year, 24-hours storms for each drainage area were then compared to the postdevelopment volumetric flows for those storms. If the postdevelopment volumes are 90-percent or more of the predevelopment volumes, then it is anticipated that there will be sufficient flow to maintain the streams and wetlands. Stormwater data was also used to check the energy balance equation for the 1-year storm event and flooding potential for the 10-year storm.

Drainage areas and study (discharge) points are illustrated on the plans provided in Attachment 1.

1.0 METHODOLOGY

Hydraflow Hydrographs software was used for computing hydrographs and routing flows through sediment basins. USDA's TR-55 was used as the basis for calculating hydrographs. Twenty-four hour precipitation depths were based on NOAA Atlas 14 rainfall data (noted in the Virginia Stormwater Management Handbook, 2013 draft) for the 1-, 2- and 10-year storms.

For predevelopment calculations, the following data and assumptions were used:

- Existing hydrologic soil group were based on USDA soil data from the Web Soil Survey. The site has "B" soils mainly.
- Land use areas were based on the 2018 aerial topography of the site. The site is mainly wooded with some grass areas, designated as open space/pasture.
- Time of concentration was estimated using overland flow (Seelye Chart) and channel flow (Kirpich Chart).

For postdevelopment calculations, the following data and assumptions were used:

- Soil in disturbed areas was assumed to be a "C" soil group due to the typical variety of soils that are used for landfill cover materials and light compaction efforts used on those cover soils.
- Land use was designated open space, since the landfill's final cover will be grass.
- Time of concentration was estimated using overland flow (Seelye Chart) and channel flow (Kirpich Chart).
- Riser structure sizing was based on the sediment basin standards in the Virginia Erosion and Sediment Control Handbook (VESCH). The sediment basin capacity and dewatering orifice diameter were changed to minimize flow during the 1-year storm (to meet energy balance requirements) while allowing for the safe conveyance of a 100-year storm without overtopping.

Hydrograph and basin routing calculations are provided in Attachment 2, Predevelopment Calculations, and Attachment 3, Postdevelopment Calculations.

For the energy balance equation per 9VAC25-870-66, volumes and peak flow rates were taken from the routing information created in Hydraflow Hydrographs.

To check for flooding, a channel cross-section was estimated using the available aerial topography. Using Manning's equation, the depth of water for the predevelopment, 10-year peak flow (from Hydraflow) was calculated to estimate if flooding would occur. These calculations are provided in Attachment 4, Flood Protection. The following decision tree was then used to dictate the next steps in the analysis:

- If flooding does not occur in predevelopment and the postdevelopment peak flow is less than the predevelopment flow, then no further analysis is needed.
- If flooding does not occur in predevelopment and the postdevelopment peak flow is greater than the predevelopment flow, then Manning's equation was used to show that the postdevelopment flow is contained in the existing channel.
- If flooding does occur in the predevelopment, then the postdevelopment peak flow will need to be less than the predevelopment peak flow to show that the existing channel is not detrimentally affected.

Flood calculations for the postdevelopment condition, if needed, are also provided in Attachment 4.

2.0 RESULTS

2.1 Hydrograph Volumes

The volume of stormwater released from each drainage area will be significantly increased in postdevelopment. The increases are attributed to the increased size of most of the drainage areas (acreage noted on drawings), the change from wooded to grassed conditions, and the assumption that fill materials in the postdeveloped condition are similar to the "C" soil group. The stormwater volumes for the 1-, 2- and 10-year storms are presented in Tables 1, 2 and 3 below.

Table 1: Pre- to Postdevelopment Comparison, 1-Year Storm

Drainage Area ID	Predevelopment Volumetric Flow (cf)	Postdevelopment Volumetric Flow (cf)
1	15,957	76,254
2	14,796	33,715
3	32,883	107,673
4	35,970	64,210
5	18,085	60,768
6	5,512	12,479
7	7,998	26,510
8	16,848	82,956
9	6,834	8,747
10	6,613	9,226

Table 2: Pre- to Postdevelopment Comparison, 2-Year Storm

Drainage Area ID	Predevelopment Volumetric Flow (cf)	Postdevelopment Volumetric Flow (cf)
1	28,657	113,834
2	27,172	51,349
3	69,563	155,758
4	79,188	100,380
5	37,051	92,366
6	12,650	17,921
7	14,089	34,305
8	30,258	118,845
9	15,046	40,113
10	15,179	33,181

Table 3: Pre- to Postdevelopment Comparison, 10-Year Storm

Drainage Area ID	Predevelopment Volumetric Flow (cf)	Postdevelopment Volumetric Flow (cf)
1	76,561	204,224
2	74,526	108,950
3	223,666	314,746
4	264,642	221,998
5	114,870	200,029
6	44,166	31,130
7	36,720	122,092
8	80,838	286,521
9	50,282	196,515
10	52,994	243,441

2.2 Energy Balance

Energy balance information is provided in Table 4 below.

Table 4: Energy Balance for the 1-Year Storm

Drainage Area ID	Qpre (cfs)	RVpre (cf)	RVpost (cf)	Qenergy (cfs)	Qpost (cfs)
1	2.44	15,957	76,254	0.41 (0.51)	0.44
2	2.07	14,796	33,715	0.73	0.32
3	2.26	32,883	107,673	0.55 (0.69)	0.57
4	2.21	35,970	64,210	0.99	0.70
5	1.62	18,085	60,768	0.39 (0.48)	0.48
6	0.30	5,512	12,479	0.11	0.06
7	1.59	7,998	26,510	0.38	0.10
8	2.75	16,848	82,956	0.45	0.41
9	0.46	6,834	8,747	0.29	0.03
10	0.37	6,613	9,226	0.21	0.03

Where: Qpre is the predevelopment peak flow
RVpre is the predevelopment hydrograph volume
RVpost is the postdevelopment hydrograph volume
Qenergy is the energy balance calculated allowable postdevelopment peak flow
Qpost is the postdevelopment peak flow from Hydraflow

For all drainage areas, the postdevelopment peak flow (Qpost) is less than the predevelopment peak flow (Qpre). For Drainage Areas 1, 3 and 5 only (highlighted in table), the Qpost is above the allowable energy balance peak flow (Qenergy). However, Drainage Areas 1, 3 and 5 are forested or mostly forested. Per the stormwater regulations, the Qpost is not required to be less than the Qenergy calculated for a forested condition (i.e., for a forested condition, the improvement factor of 0.8 is not included). The Qenergy for a forested condition is shown in parentheses within the table. Based on the "forested condition," the Qpost for Drainage Areas 1, 3 and 5 are acceptable.

2.3 Flooding Potential

Existing stormwater conveyance systems generally consist of steep ravines several feet in height. Based on the calculated predevelopment channel depths (see Table 5), the 10-year flows would not spill out of the existing conveyance systems. Also, due to the relatively low velocities and depths less than a foot, the flows are unlikely to damage property or create unsafe conditions along the conveyance system. Therefore, the conveyance systems do not experience localized flooding in the predevelopment condition.

Table 5: Flooding Potential for 10-Year Flows

Drainage Area ID	Q10 Predevelopment (cfs)	Velocity (fps)	Depth (ft)	Q10 Postdevelopment (cfs)
1	19.31	3.34	0.42	0.85
2	18.57	2.70	0.38	0.68
3	42.27	5.50	0.65	5.63
4	53.07	3.34	0.94	1.59
5	28.60	2.56	0.43	19.77
6	10.15	2.79	0.48	0.12
7	11.11	3.29	0.34	3.62
8	21.76	4.67	0.54	11.12
9	13.43	2.70	0.82	5.03
10	13.76	2.34	0.56	18.22

In the postdevelopment condition, only discharge from Basin 10/Drainage Area 10 has a flow greater than the predevelopment condition. Based on the calculation for postdevelopment, the flow remains within the conveyance system; depth of water increases only 0.08-ft to 0.62-ft. The velocity increases to 2.56 fps, which is still relatively slow and would not cause erosive conditions. Therefore, the postdevelopment condition for Basin 10 would not create localized flooding or be detrimental to the existing conveyance system.

3.0 CONCLUSIONS

Overall, the postdevelopment stormwater volumes are significantly more than the predevelopment volumes. Therefore, there will be sufficient stormwater to feed the streams and wetlands. The only exceptions are the 10-year storm volumes for Drainage Areas 4 and 6, where the postdevelopment volumes are below the predevelopment volumes. Since the 1- and 2-year storms account for more than 95-percent of the likely rainfall events per the Virginia Stormwater Management Handbook (2013 draft, Chapter 10), it is unlikely that the reduced volume in the larger 10-year storm will significantly impact the downstream area.

The energy balance requirements for channel protection are met in each drainage area and there is no localized flooding for the 10-year storm. Since these water quantity criteria have been met, it is anticipated that there will be no detrimental effects to the downstream areas.

Please do not hesitate to contact me if you have any questions or require any additional information.

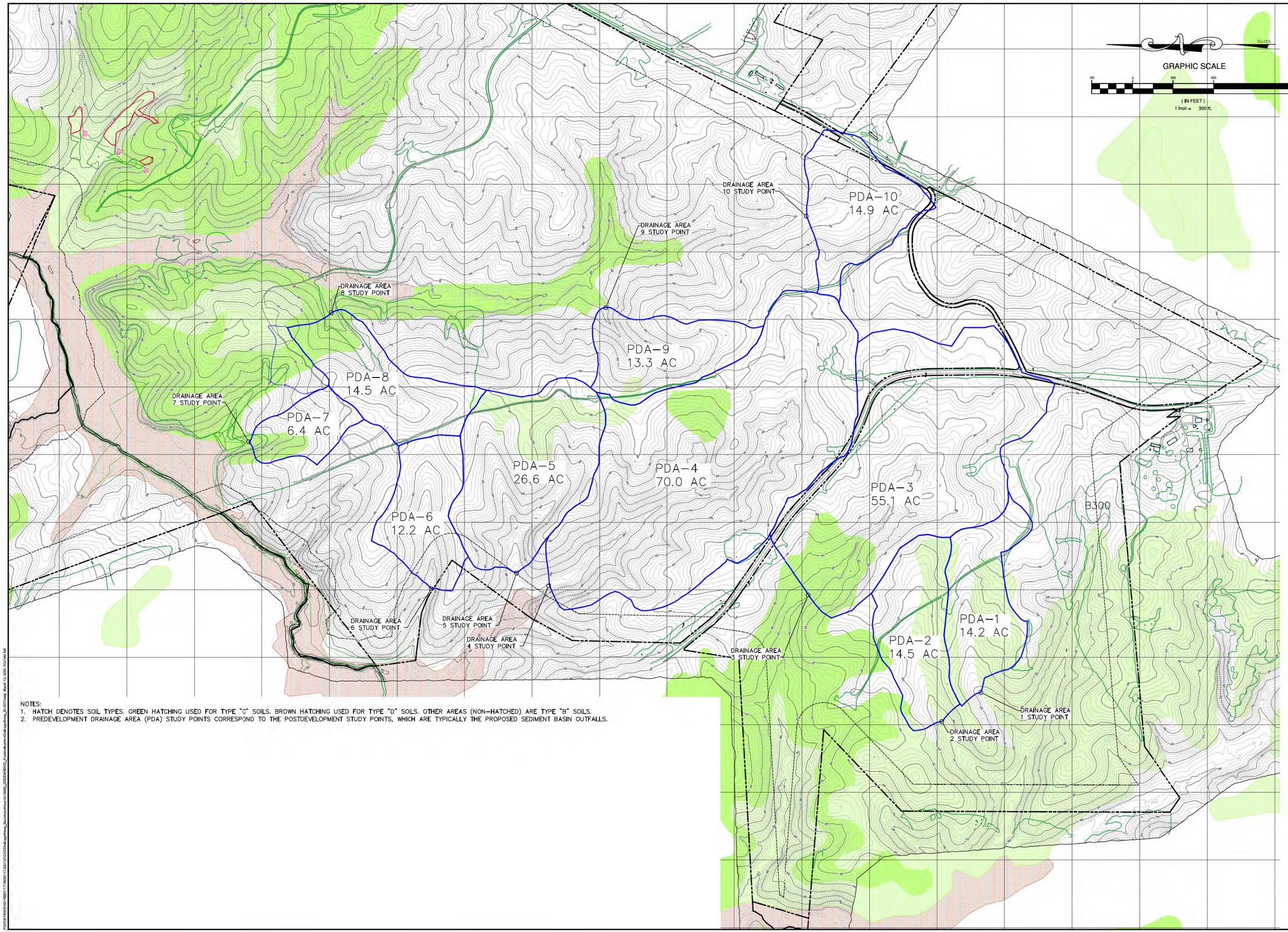
Sincerely,
Draper Aden Associates

Anthony S. Tomlin, PE
Program Engineer

Attachments

cc: Bill Hase and Lynn Klappich/Draper Aden Associates

ATTACHMENT 1
DRAWINGS



NOTES:
1. HATCH DENOTES SOIL TYPES. GREEN HATCHING USED FOR TYPE "C" SOILS. BROWN HATCHING USED FOR TYPE "D" SOILS. OTHER AREAS (NON-HATCHED) ARE TYPE "B" SOILS.
2. PREDEVELOPMENT DRAINAGE AREA (PDA) STUDY POINTS CORRESPOND TO THE POSTDEVELOPMENT STUDY POINTS, WHICH ARE TYPICALLY THE PROPOSED SEDIMENT BASIN OUTFALLS.

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PREDEVELOPMENT DRAINAGE AREAS

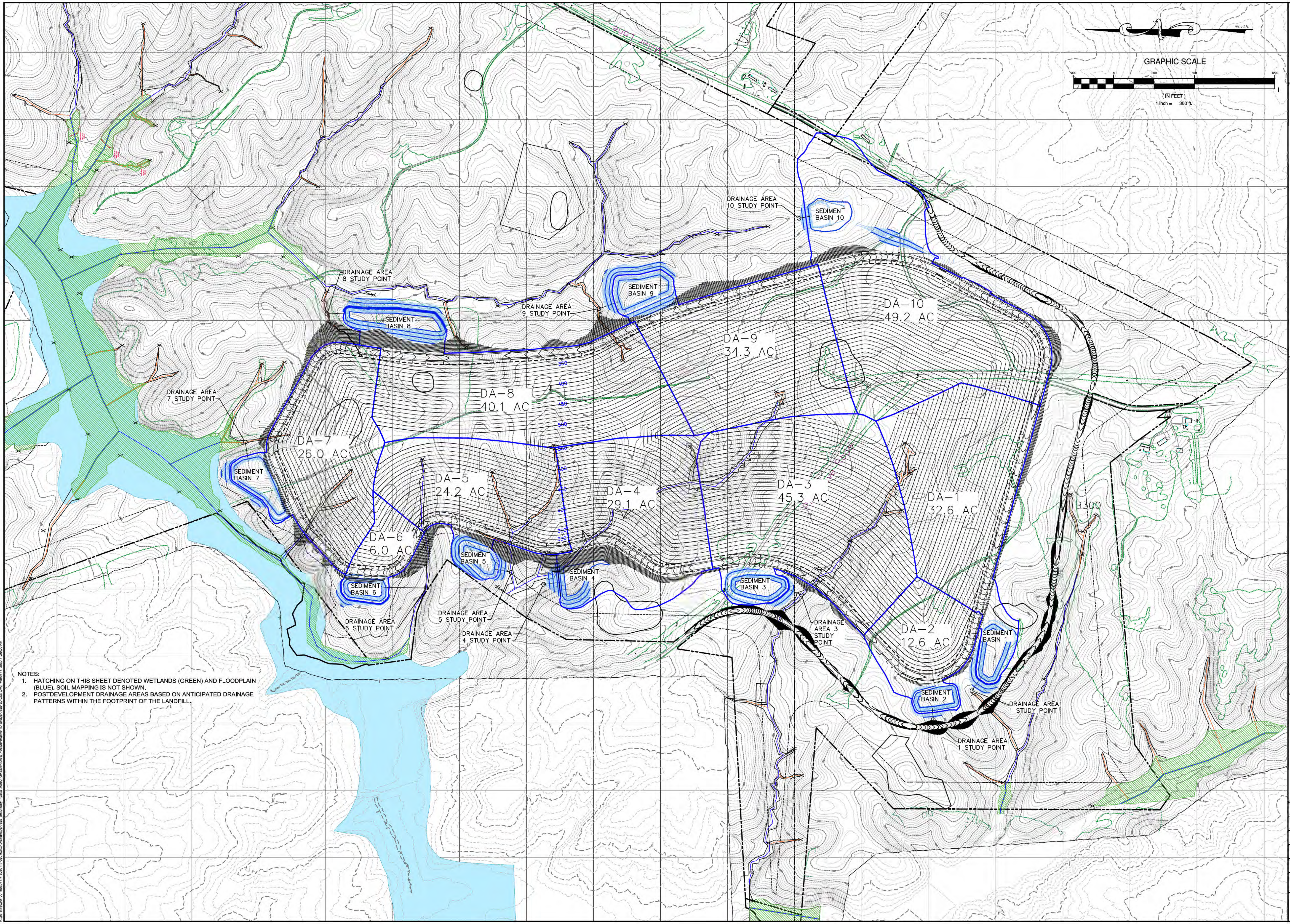
GREEN RIDGE RECYCLING AND DISPOSAL FACILITY

CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	AST
DRAWN BY:	DLD/AST
CHECKED BY:	-
SCALE:	1" = 300'
DATE:	03/09/2020
PROJECT NUMBER:	18020117-0301C2

1



NOTES:
1. HATCHING ON THIS SHEET DENOTED WETLANDS (GREEN) AND FLOODPLAIN (BLUE), SOIL MAPPING IS NOT SHOWN.
2. POSTDEVELOPMENT DRAINAGE AREAS BASED ON ANTICIPATED DRAINAGE PATTERNS WITHIN THE FOOTPRINT OF THE LANDFILL.

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POSTDEVELOPMENT DRAINAGE AREAS

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DESIGNED BY:	AST
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2

ATTACHMENT 2
PREDEVELOPMENT CALCULATIONS

Hydrograph Report

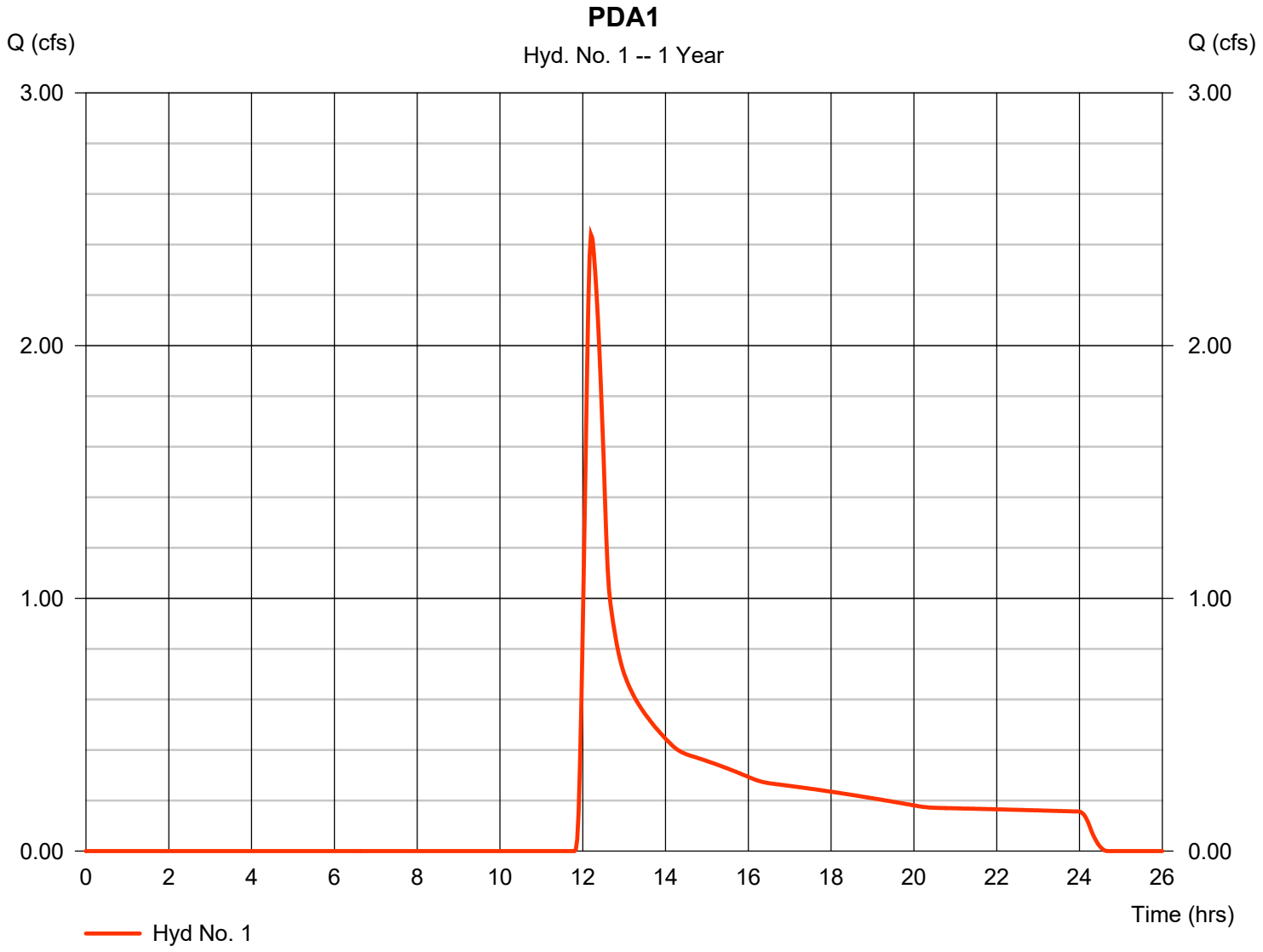
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.439 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 15,957 cuft
Drainage area	= 14.200 ac	Curve number	= 63*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 23.50 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.160 x 61) + (0.170 x 74) + (6.770 x 55) + (7.100 x 70)] / 14.200



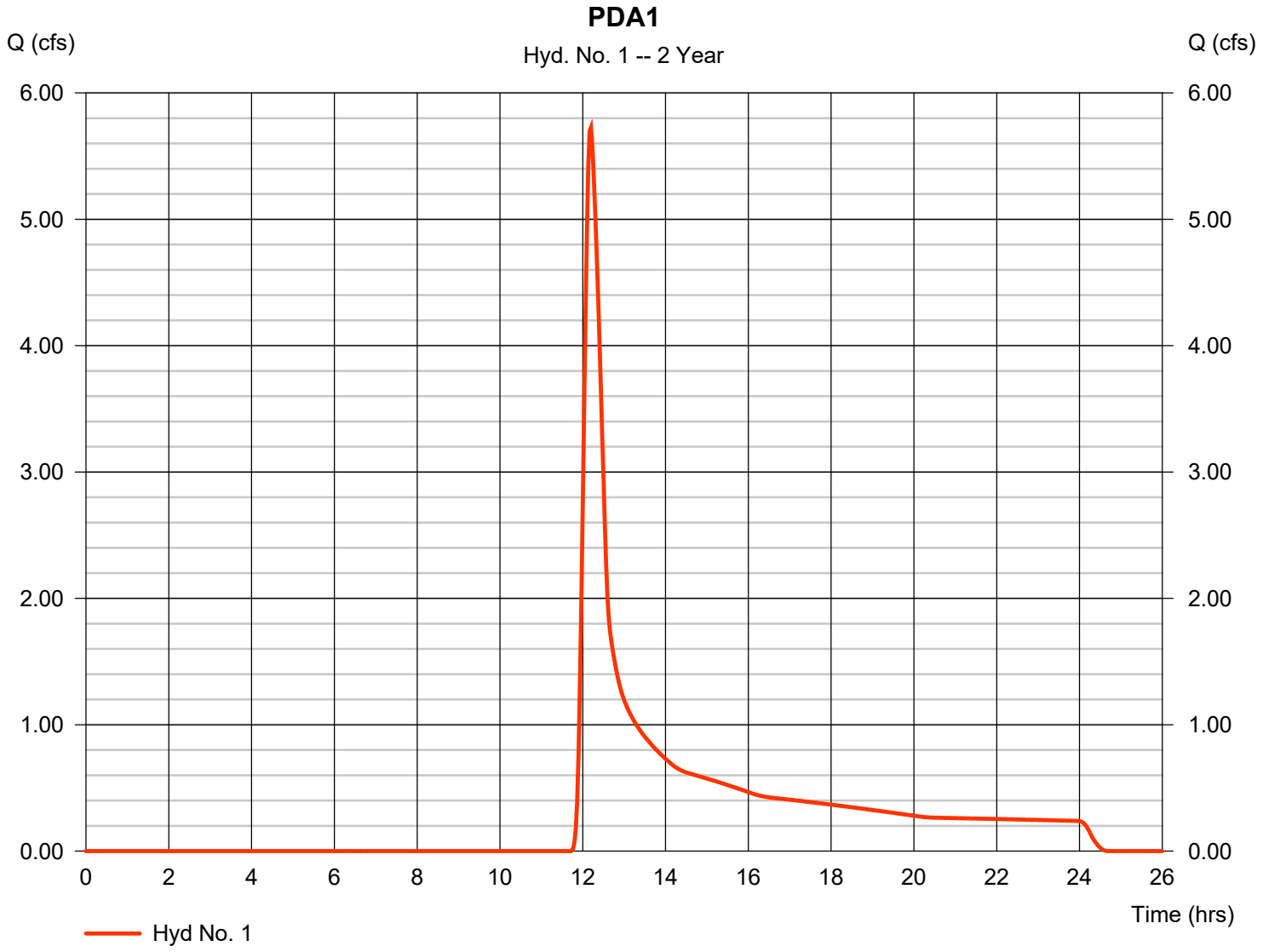
Hydrograph Report

Hyd. No. 1

PDA1

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.725 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	28,657 cuft
Drainage area	=	14.200 ac	Curve number	=	63*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	23.50 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.160 x 61) + (0.170 x 74) + (6.770 x 55) + (7.100 x 70)] / 14.200



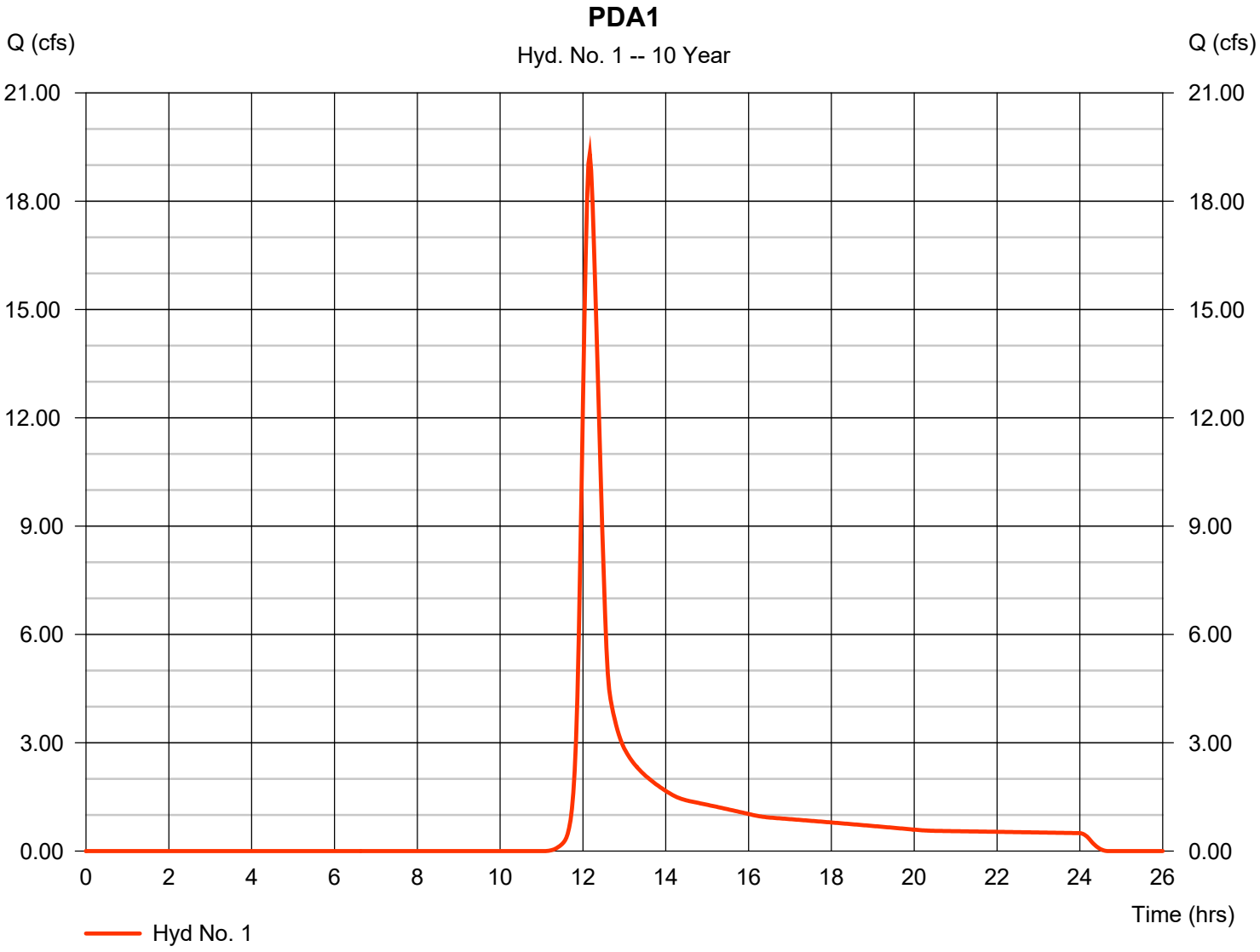
Hydrograph Report

Hyd. No. 1

PDA1

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.31 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	76,561 cuft
Drainage area	=	14.200 ac	Curve number	=	63*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	23.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.160 x 61) + (0.170 x 74) + (6.770 x 55) + (7.100 x 70)] / 14.200



Hydrograph Report

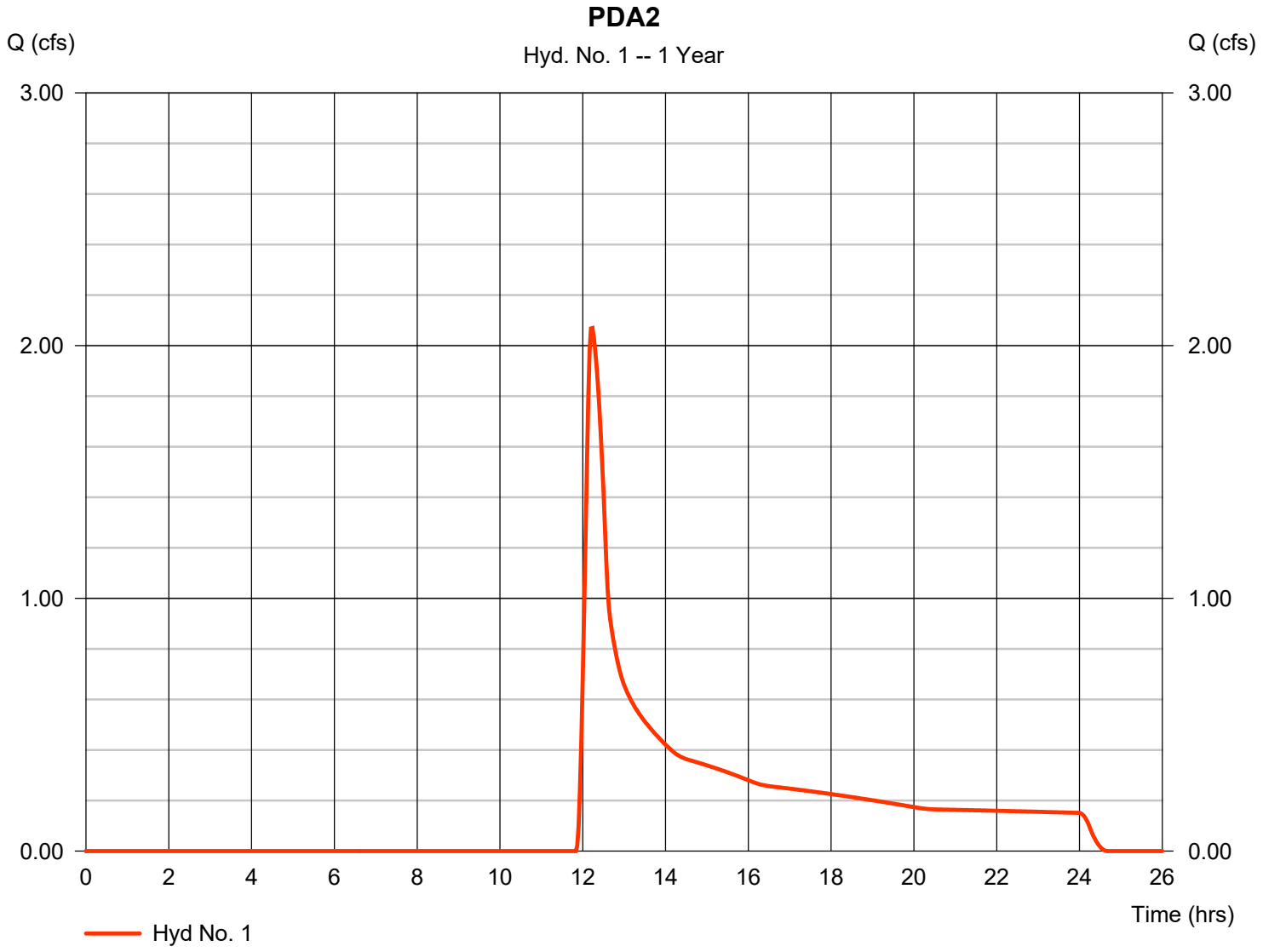
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA2

Hydrograph type	= SCS Runoff	Peak discharge	= 2.070 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 14,796 cuft
Drainage area	= 14.500 ac	Curve number	= 62*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = + (0.120 x 74) + (7.850 x 55) + (6.530 x 70)] / 14.500



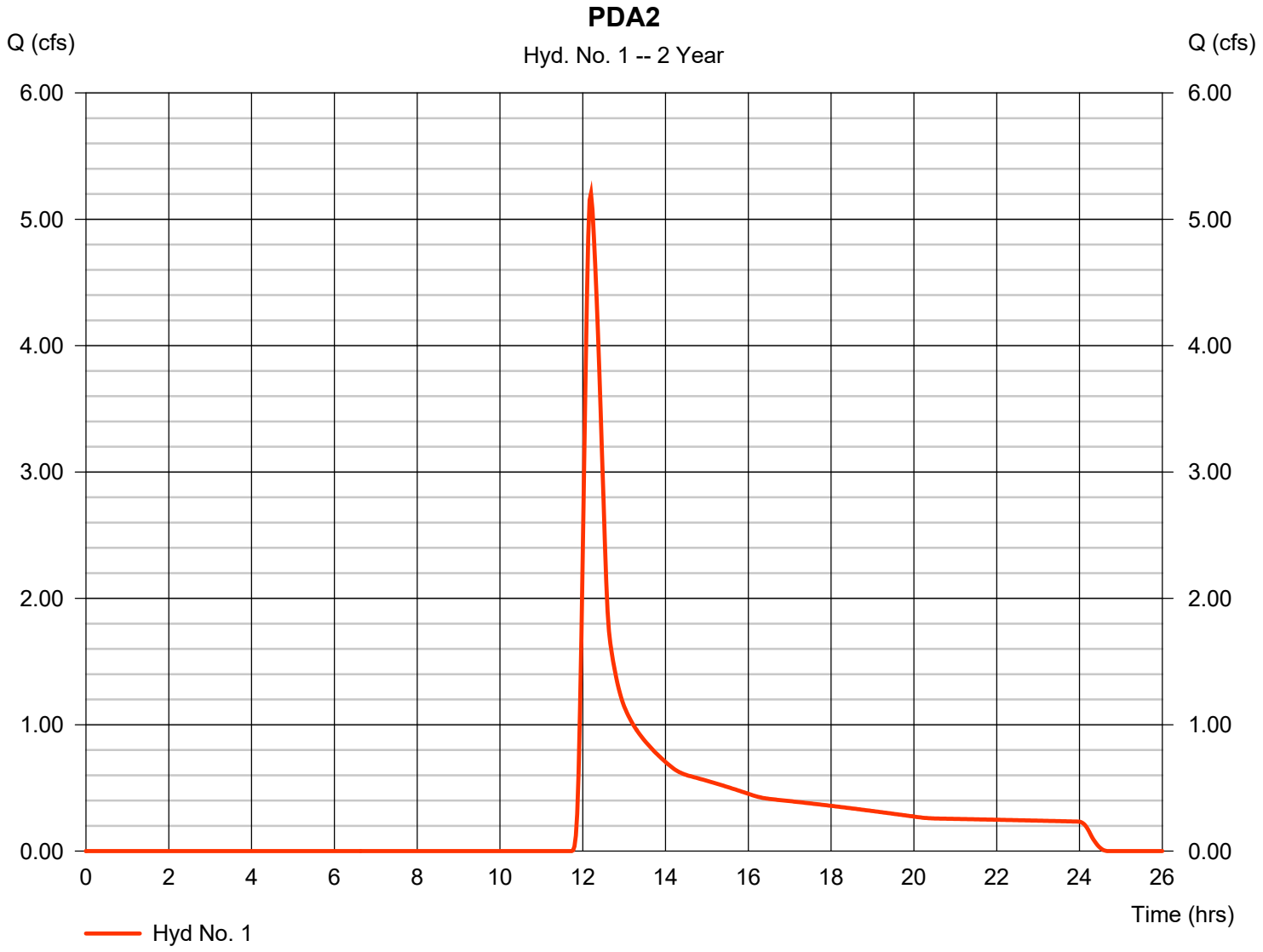
Hydrograph Report

Hyd. No. 1

PDA2

Hydrograph type	= SCS Runoff	Peak discharge	= 5.202 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 27,172 cuft
Drainage area	= 14.500 ac	Curve number	= 62*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.00 min
Total precip.	= 3.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = + (0.120 x 74) + (7.850 x 55) + (6.530 x 70)] / 14.500



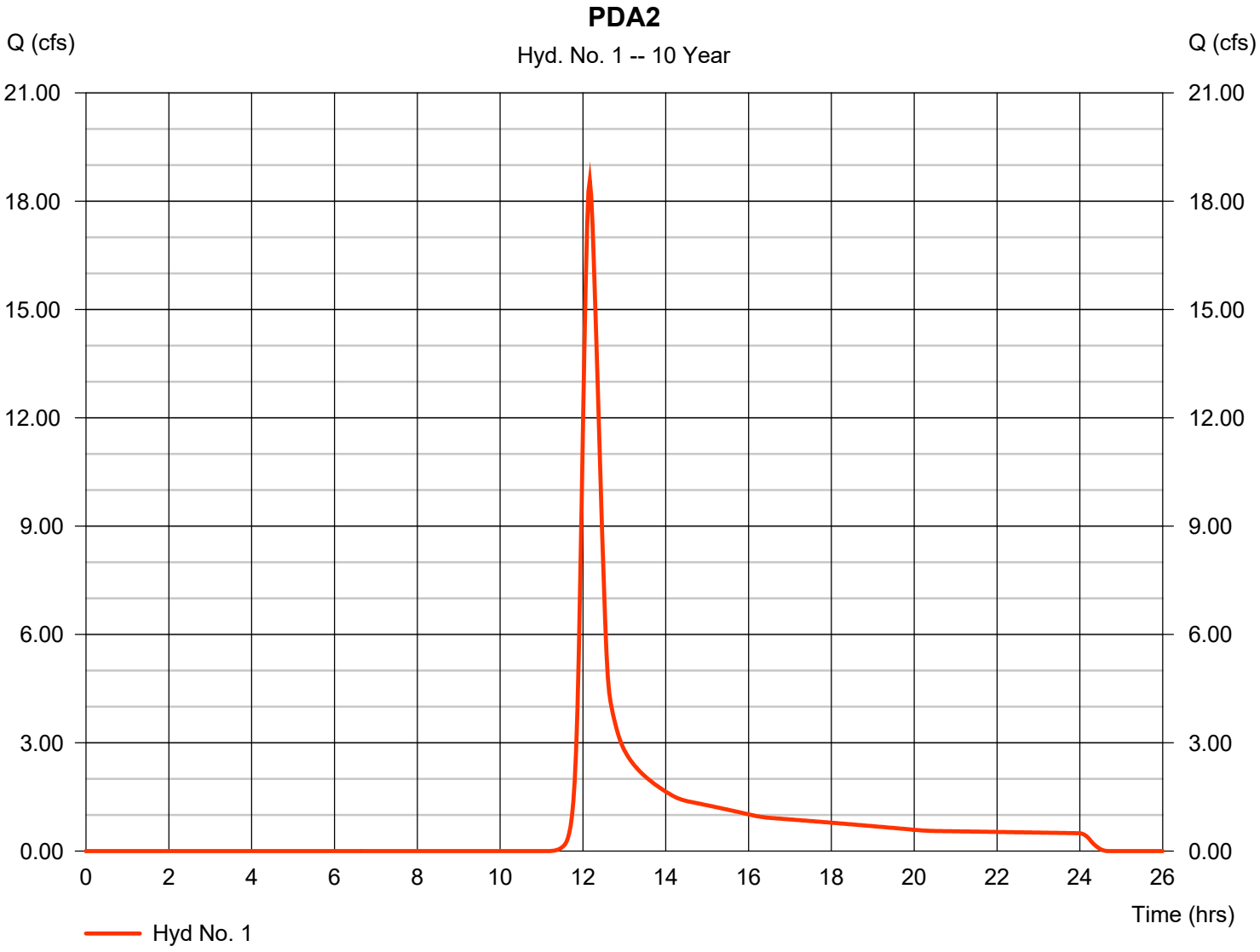
Hydrograph Report

Hyd. No. 1

PDA2

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.57 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	74,526 cuft
Drainage area	=	14.500 ac	Curve number	=	62*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	25.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = + (0.120 x 74) + (7.850 x 55) + (6.530 x 70)] / 14.500



Hydrograph Report

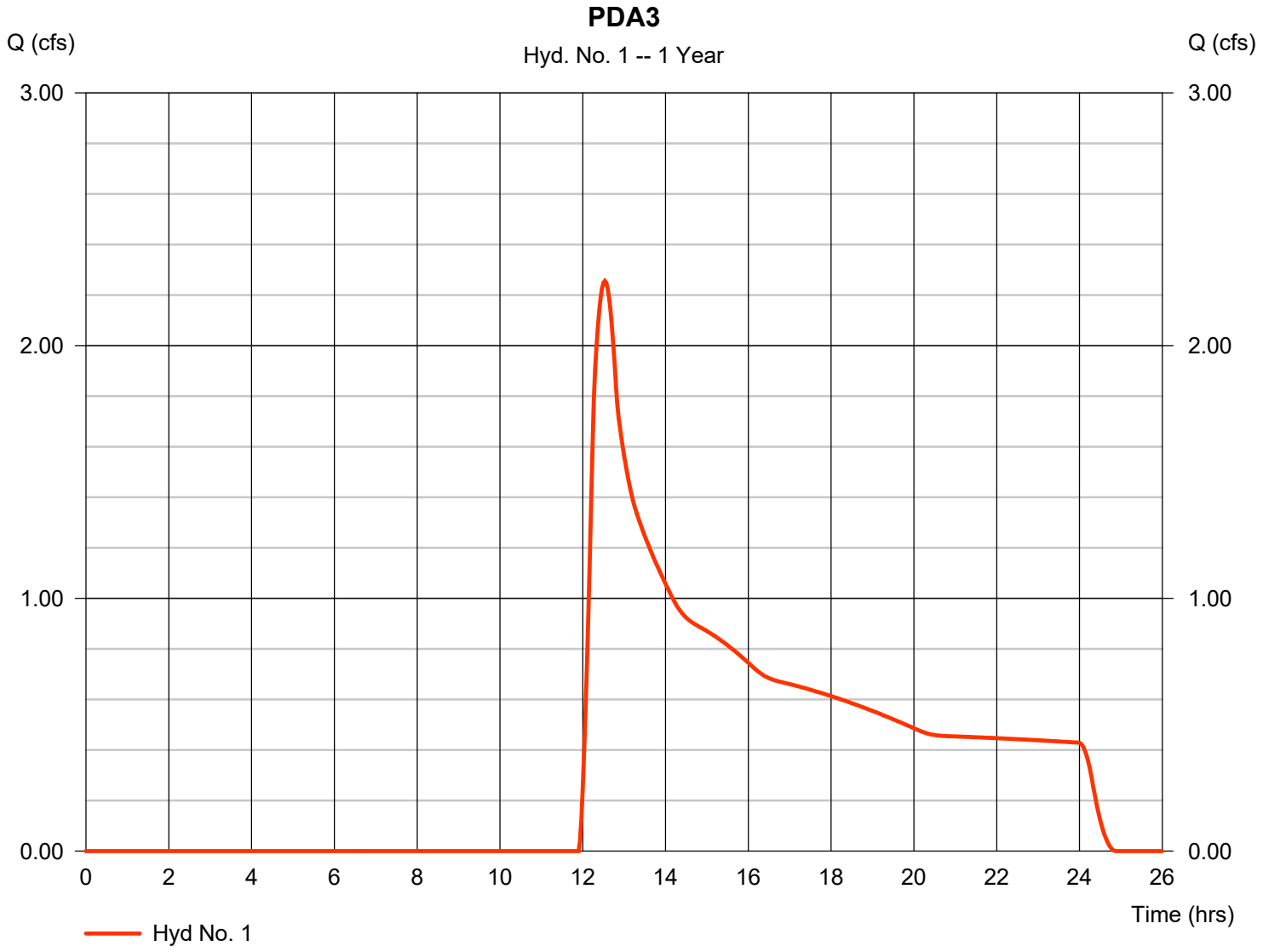
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.256 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 32,883 cuft
Drainage area	= 55.100 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 31.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.150 x 61) + (43.370 x 55) + (6.580 x 70)] / 55.100



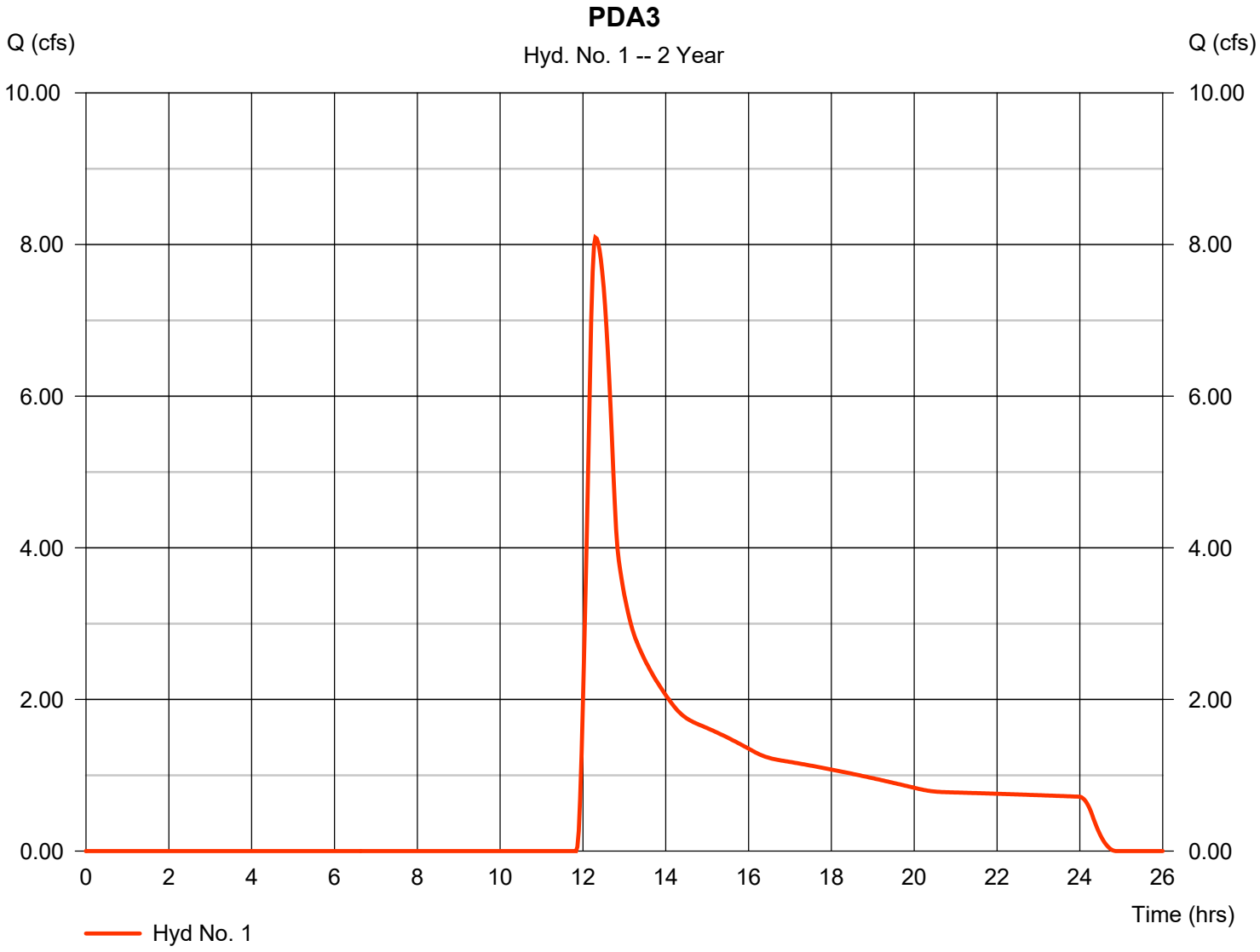
Hydrograph Report

Hyd. No. 1

PDA3

Hydrograph type	= SCS Runoff	Peak discharge	= 8.091 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 69,563 cuft
Drainage area	= 55.100 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 31.00 min
Total precip.	= 3.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.150 x 61) + (43.370 x 55) + (6.580 x 70)] / 55.100



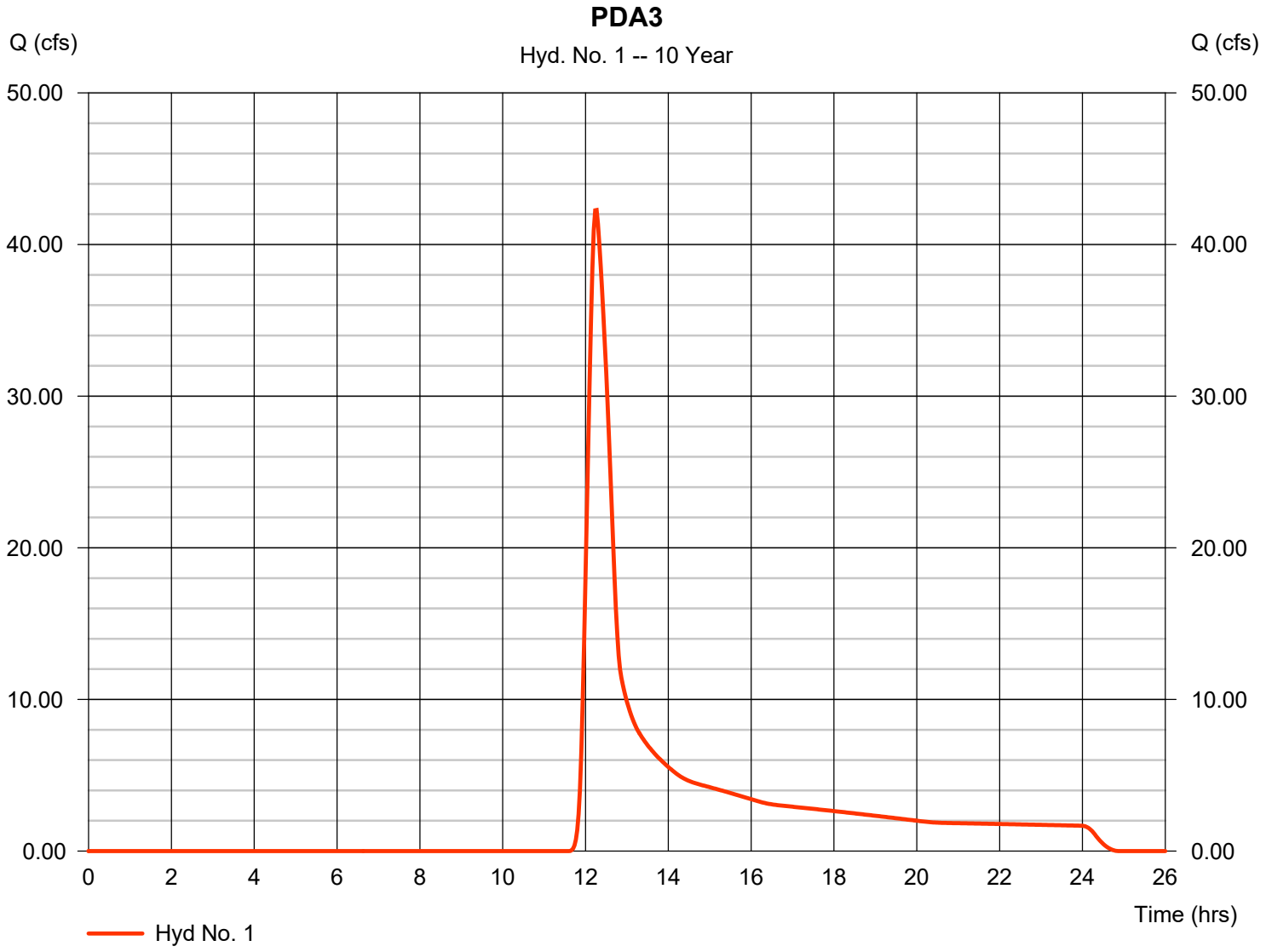
Hydrograph Report

Hyd. No. 1

PDA3

Hydrograph type	=	SCS Runoff	Peak discharge	=	42.27 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	223,666 cuft
Drainage area	=	55.100 ac	Curve number	=	57*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	31.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(5.150 x 61) + (43.370 x 55) + (6.580 x 70)] / 55.100



Hydrograph Report

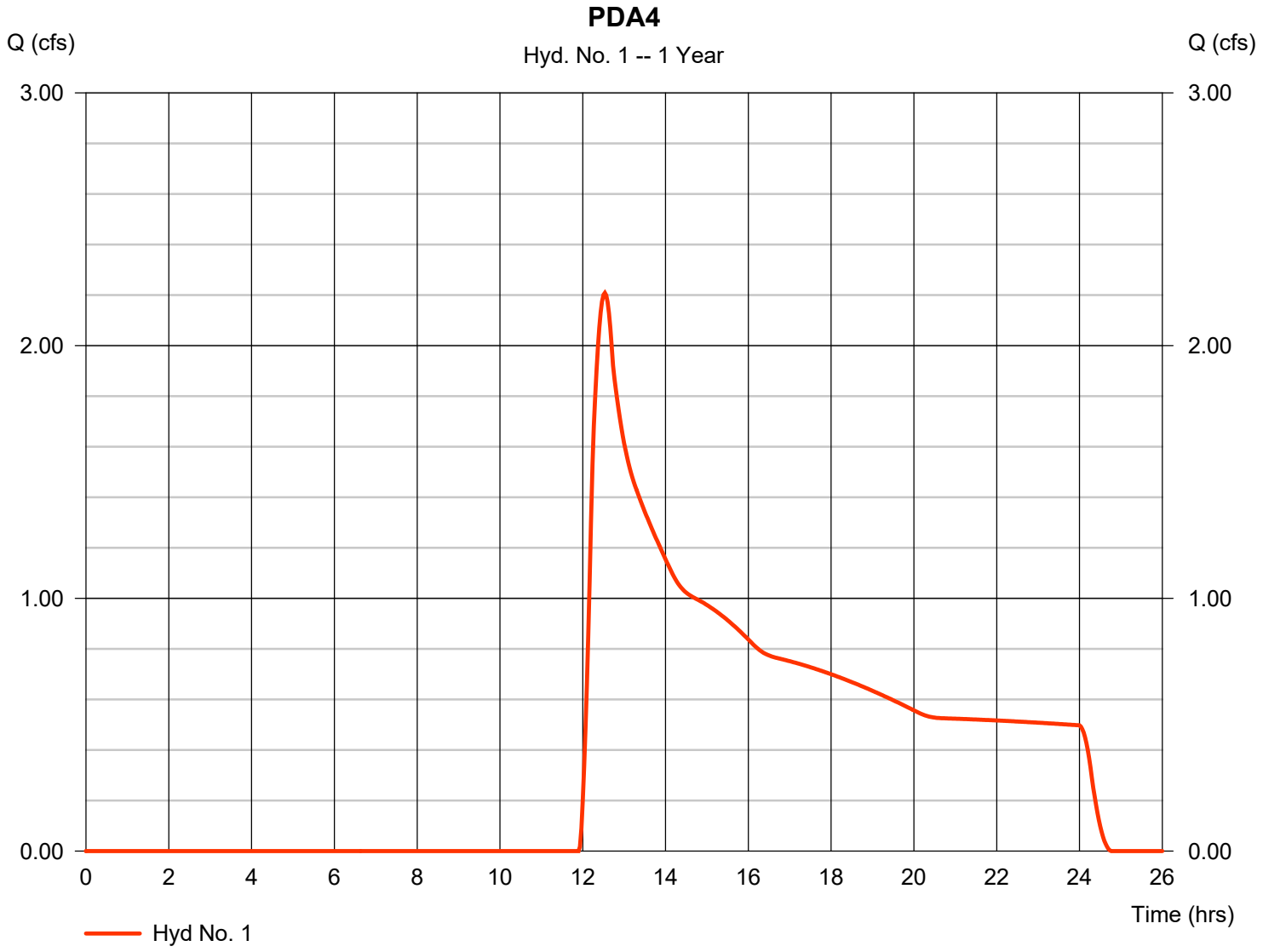
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA4

Hydrograph type	= SCS Runoff	Peak discharge	= 2.209 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 35,970 cuft
Drainage area	= 70.000 ac	Curve number	= 56*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 28.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.430 x 61) + (64.850 x 55) + (3.720 x 70)] / 70.000



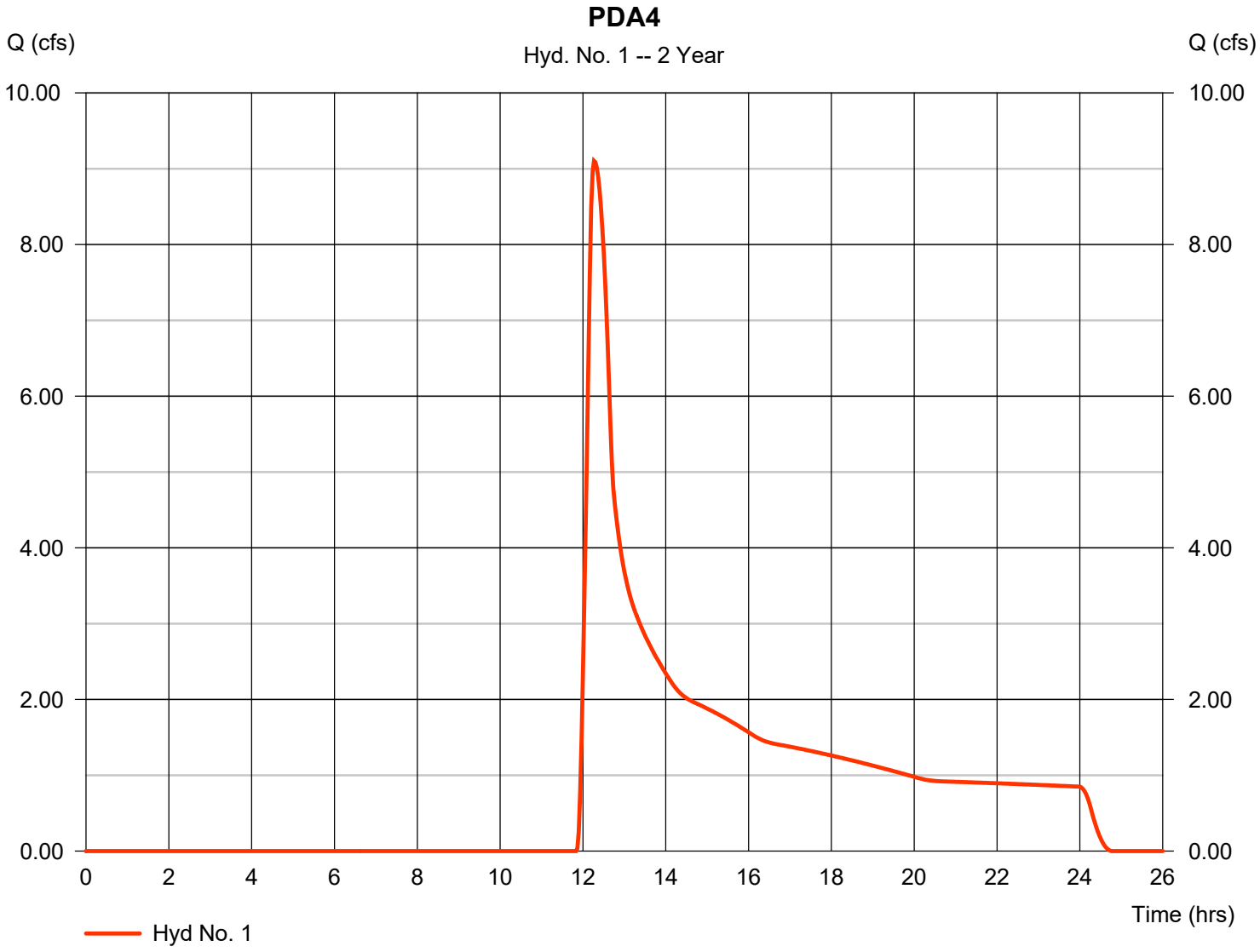
Hydrograph Report

Hyd. No. 1

PDA4

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.103 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	79,188 cuft
Drainage area	=	70.000 ac	Curve number	=	56*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	28.00 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.430 x 61) + (64.850 x 55) + (3.720 x 70)] / 70.000



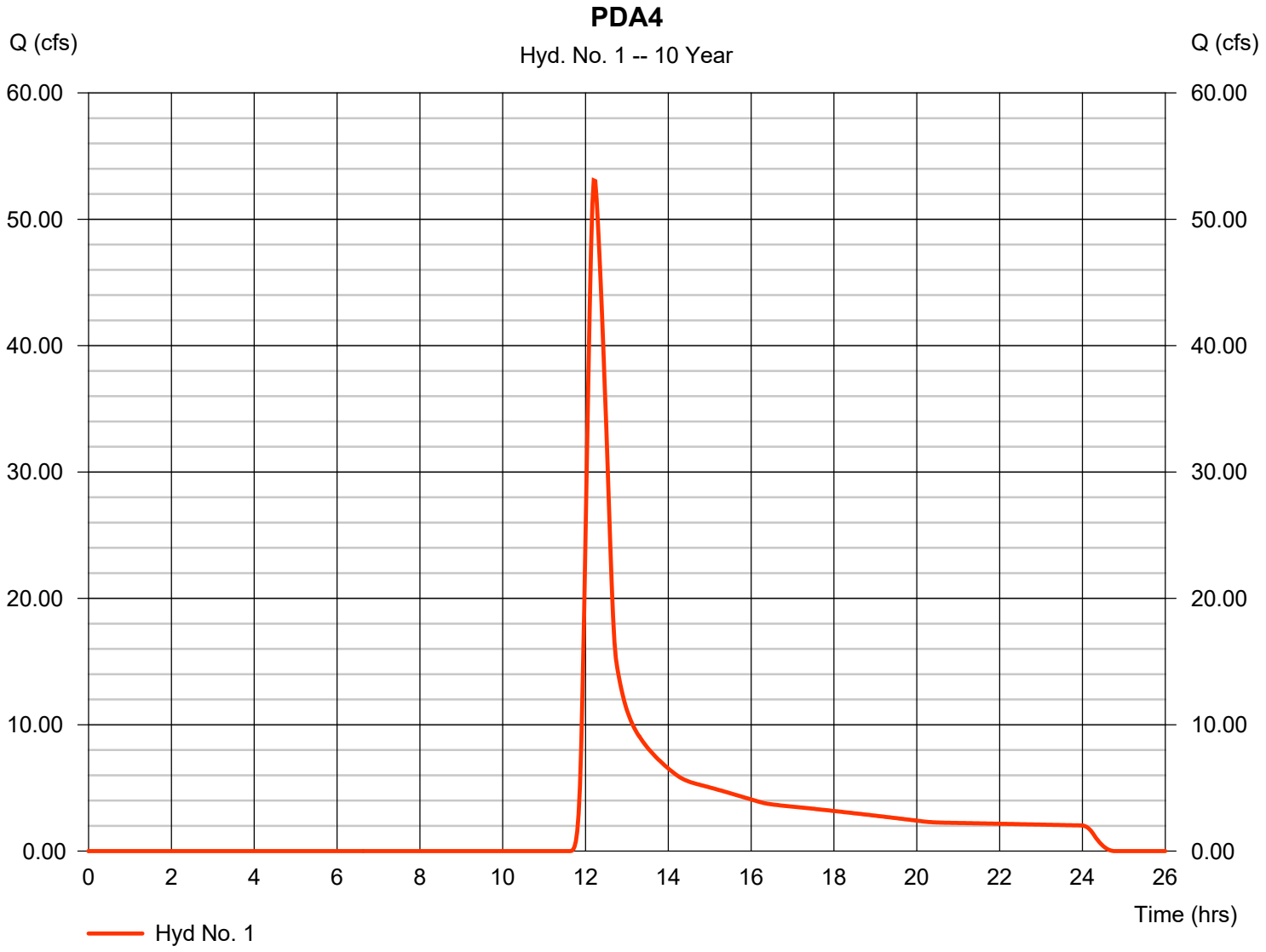
Hydrograph Report

Hyd. No. 1

PDA4

Hydrograph type	=	SCS Runoff	Peak discharge	=	53.07 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	264,642 cuft
Drainage area	=	70.000 ac	Curve number	=	56*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	28.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.430 x 61) + (64.850 x 55) + (3.720 x 70)] / 70.000



Hydrograph Report

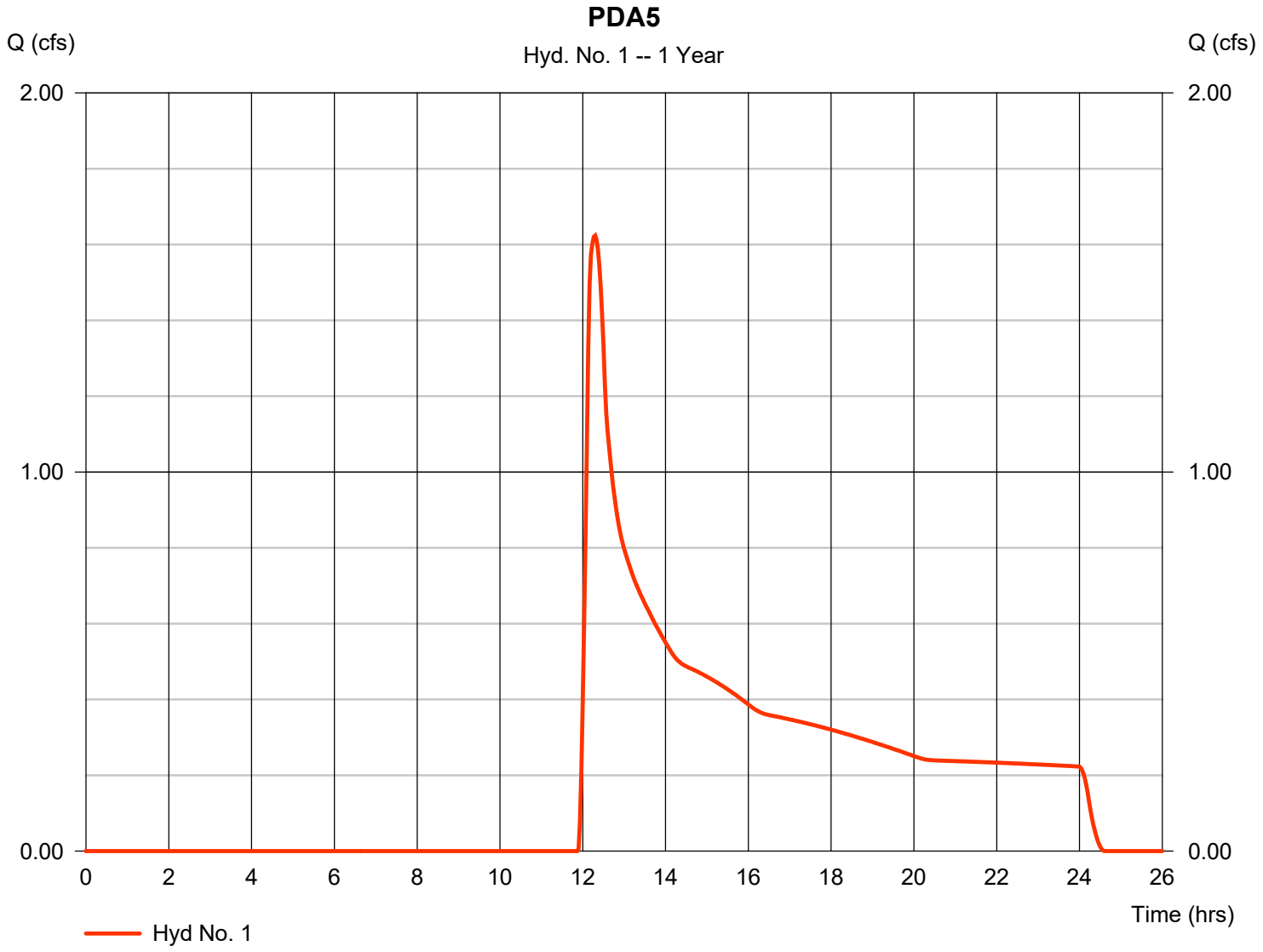
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA5

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.624 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.30 hrs
Time interval	=	2 min	Hyd. volume	=	18,085 cuft
Drainage area	=	26.600 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.50 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = + (20.900 x 55) + (5.700 x 70)] / 26.600



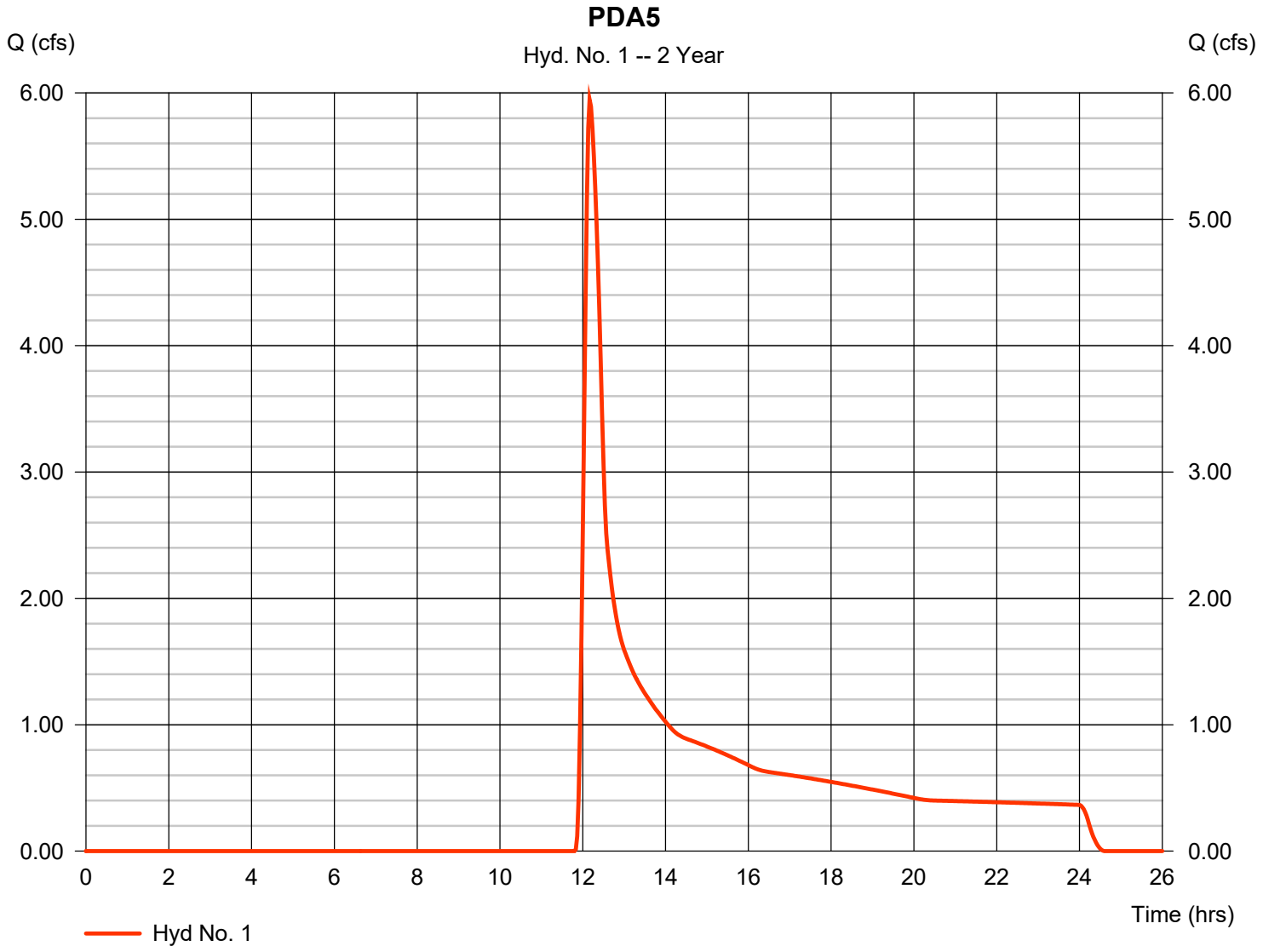
Hydrograph Report

Hyd. No. 1

PDA5

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.945 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	37,051 cuft
Drainage area	=	26.600 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.50 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = + (20.900 x 55) + (5.700 x 70)] / 26.600



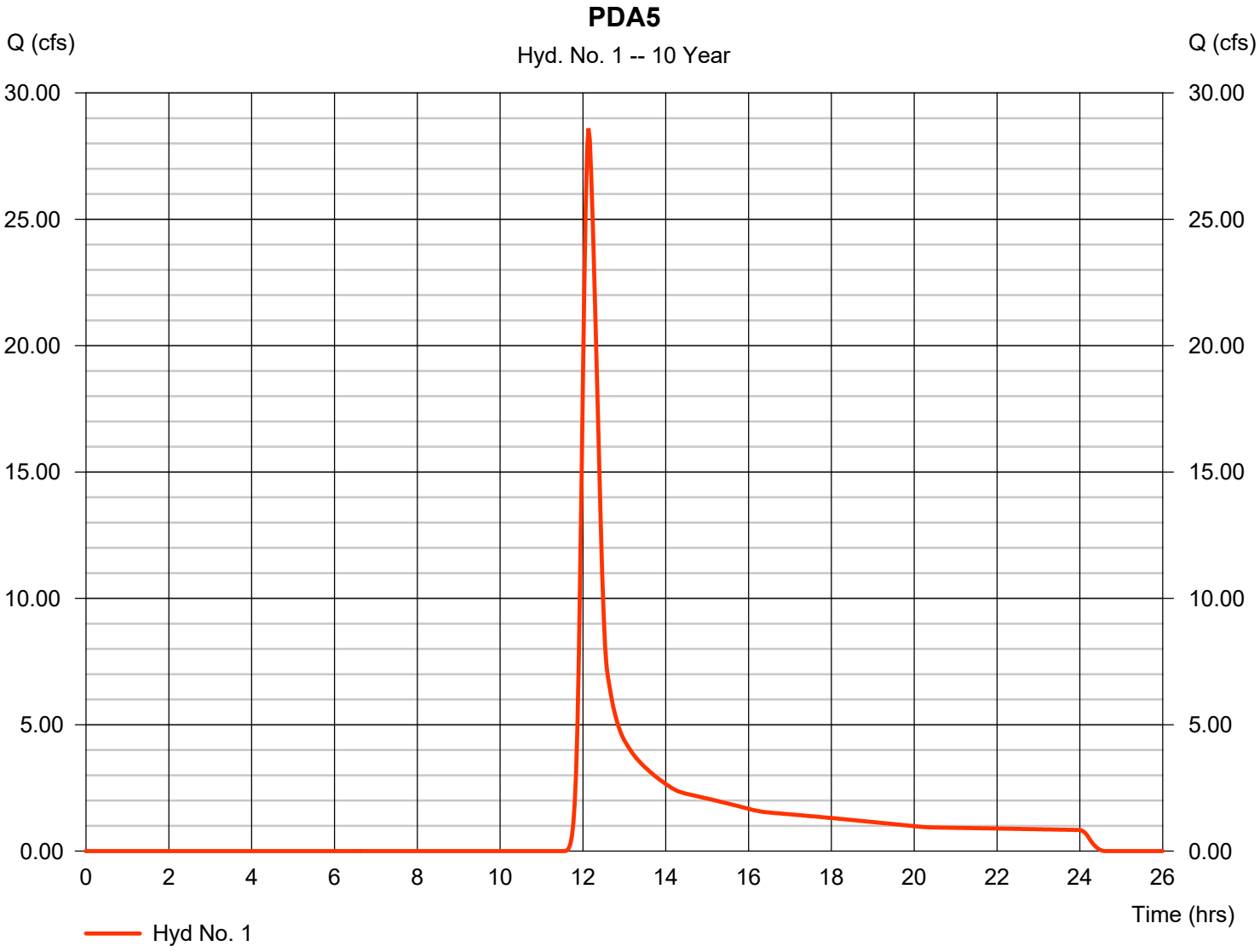
Hydrograph Report

Hyd. No. 1

PDA5

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.60 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	114,870 cuft
Drainage area	=	26.600 ac	Curve number	=	58*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = + (20.900 x 55) + (5.700 x 70)] / 26.600



Hydrograph Report

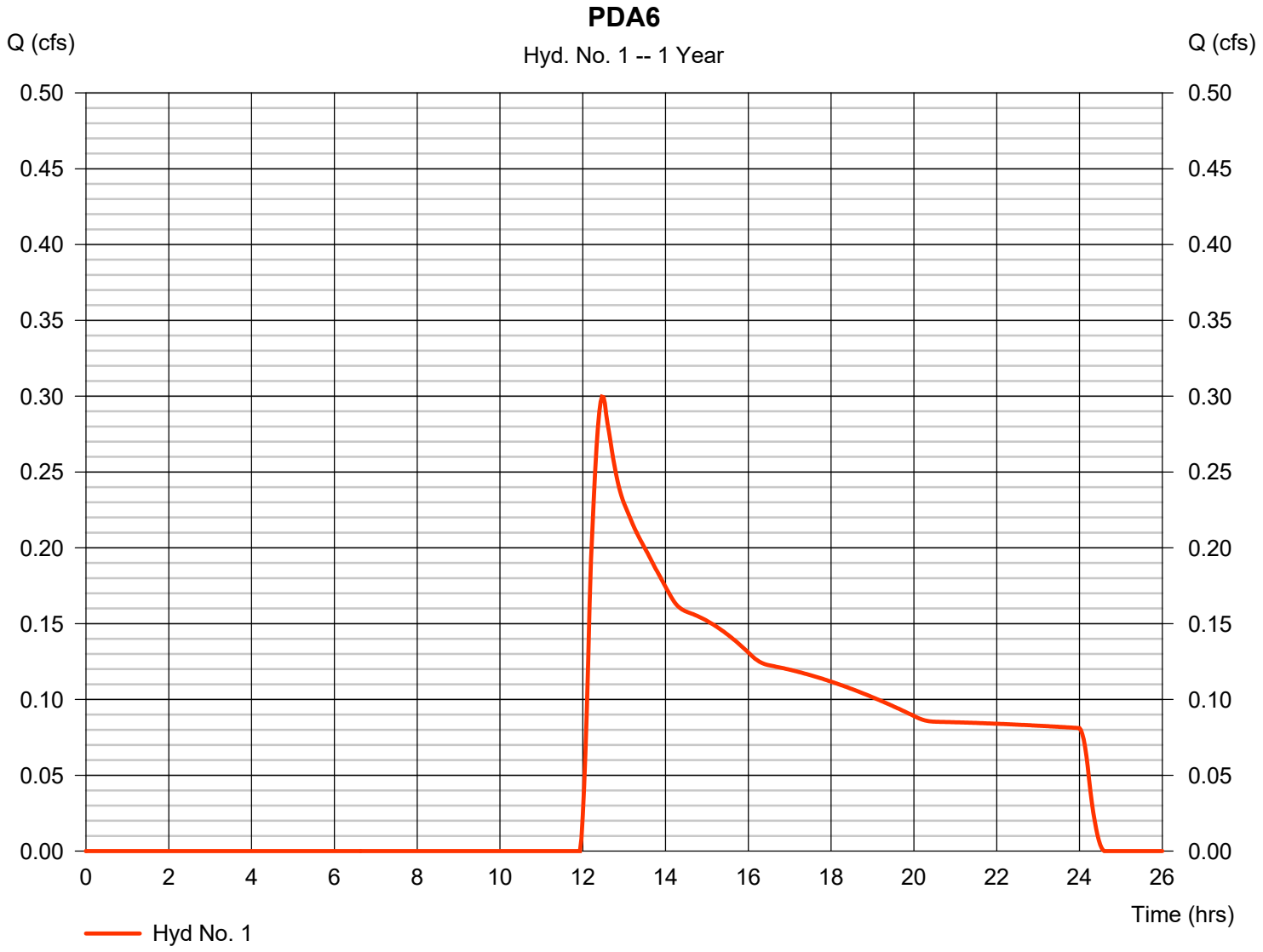
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA6

Hydrograph type	= SCS Runoff	Peak discharge	= 0.300 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.47 hrs
Time interval	= 2 min	Hyd. volume	= 5,512 cuft
Drainage area	= 12.200 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.50 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = + (12.200 x 55)] / 12.200



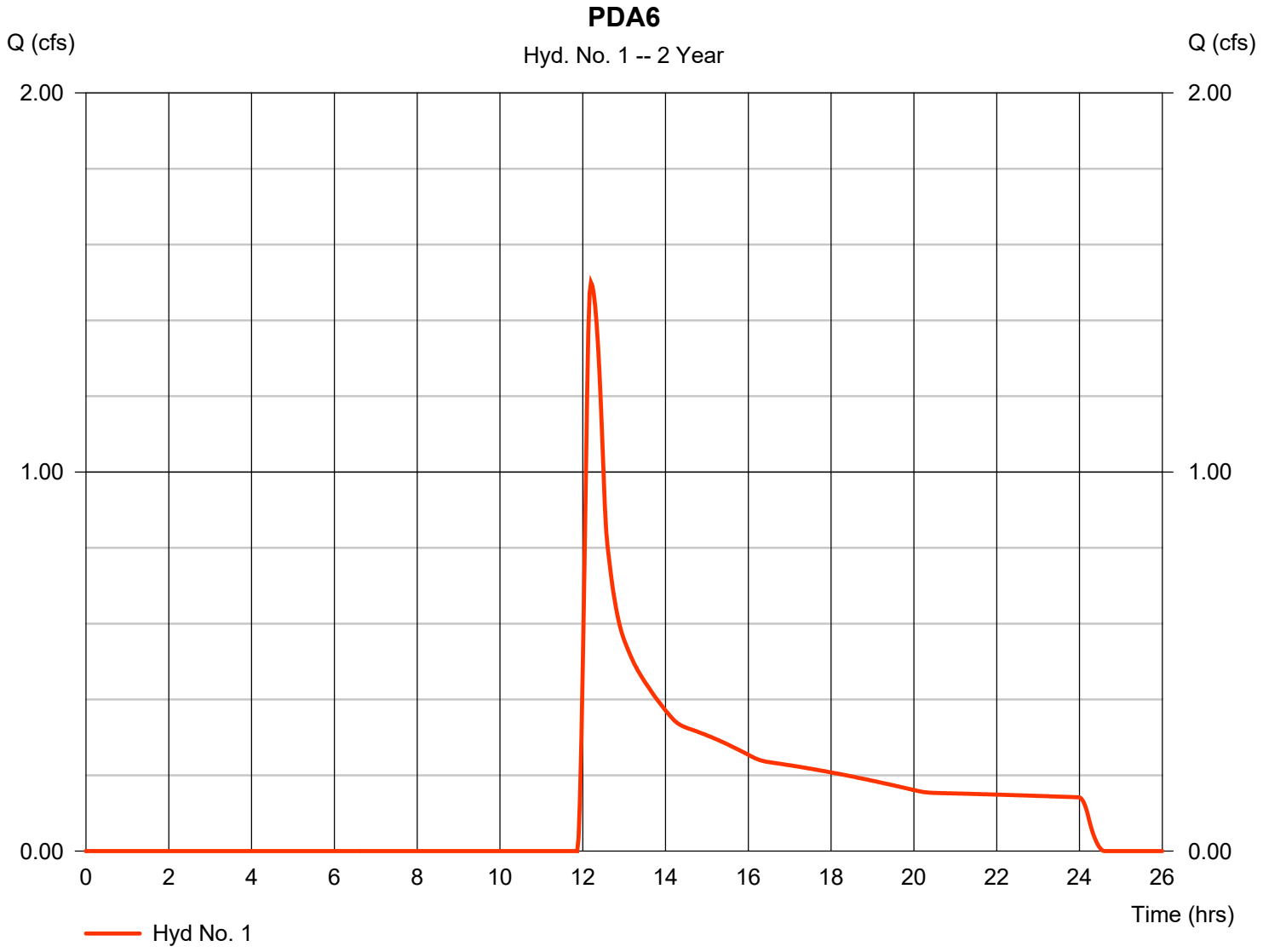
Hydrograph Report

Hyd. No. 1

PDA6

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.500 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	12,650 cuft
Drainage area	=	12.200 ac	Curve number	=	55*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	20.50 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = + (12.200 x 55)] / 12.200



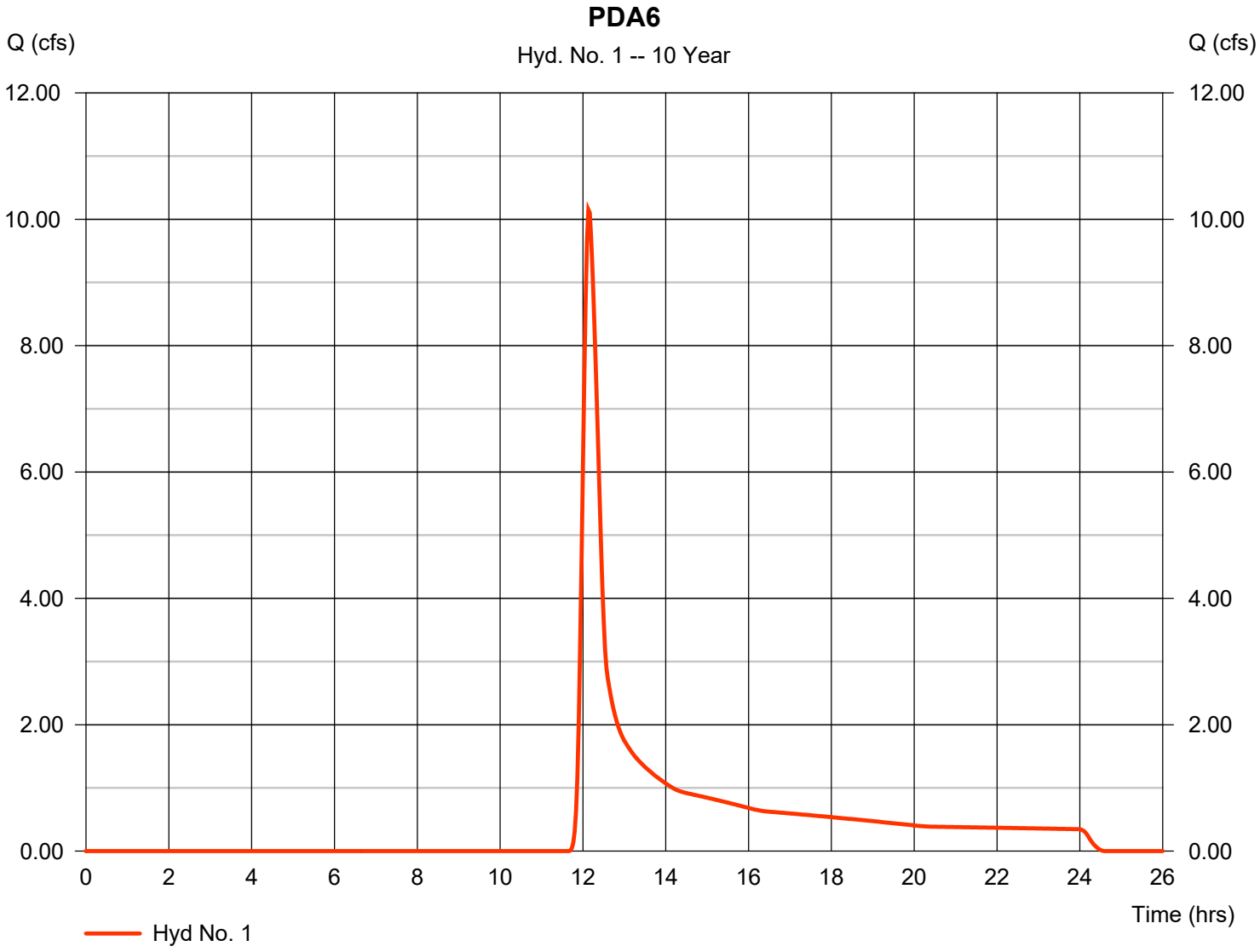
Hydrograph Report

Hyd. No. 1

PDA6

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.15 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	44,166 cuft
Drainage area	=	12.200 ac	Curve number	=	55*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	20.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = + (12.200 x 55)] / 12.200



Hydrograph Report

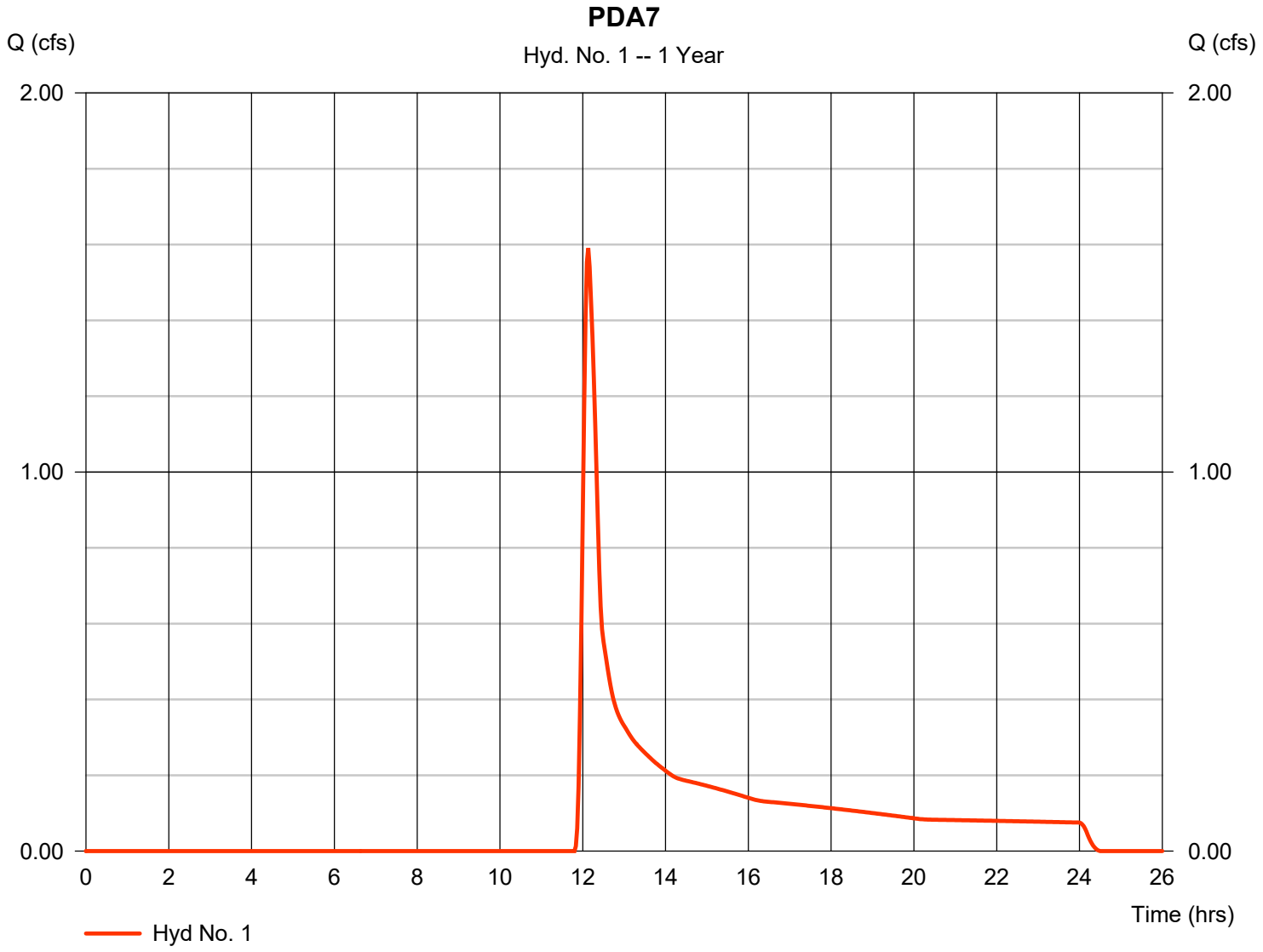
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA7

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.590 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	7,998 cuft
Drainage area	=	6.400 ac	Curve number	=	64*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(4.810 x 61) + (1.350 x 74) + (0.240 x 70)] / 6.400



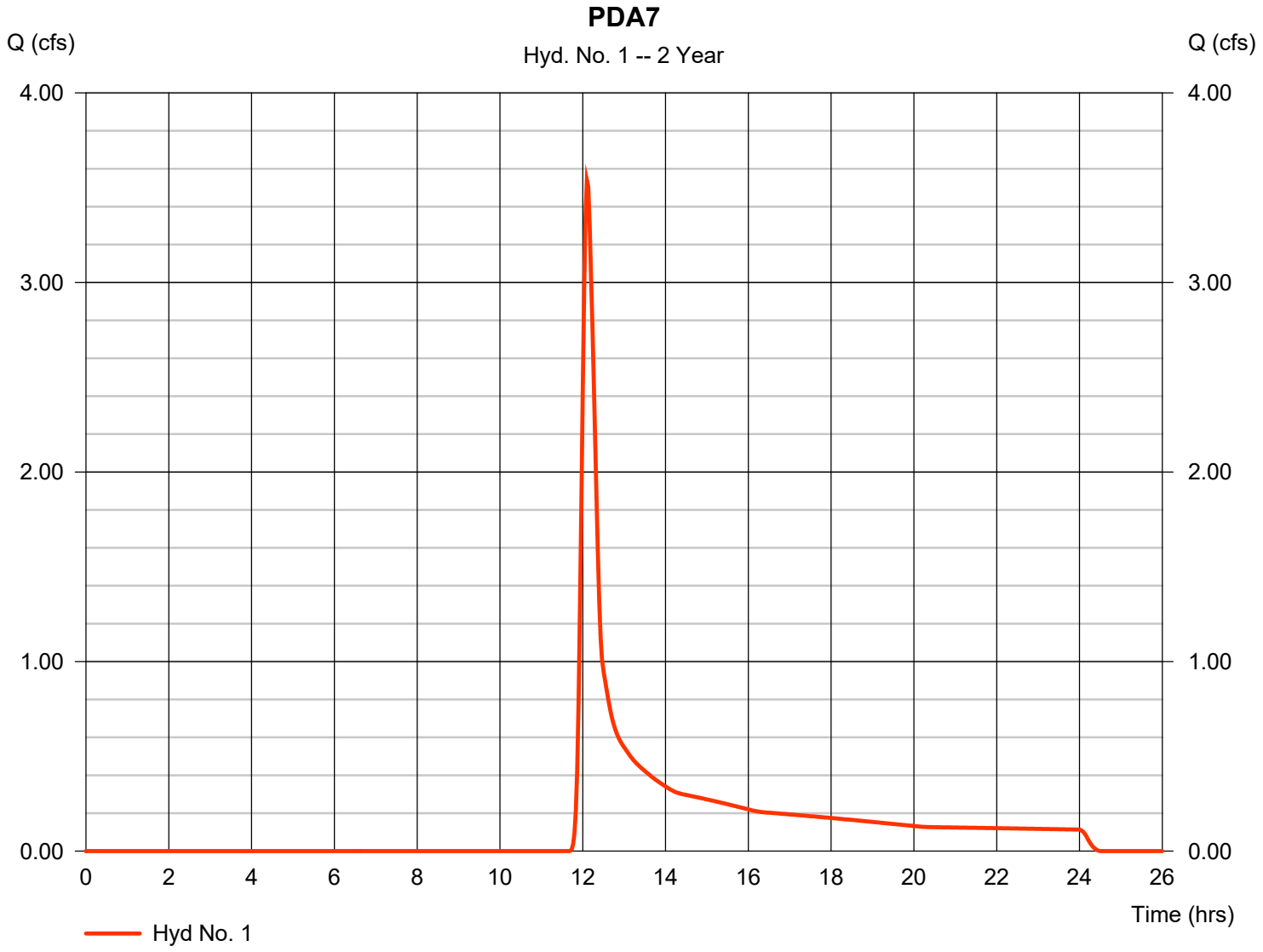
Hydrograph Report

Hyd. No. 1

PDA7

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.539 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	14,089 cuft
Drainage area	=	6.400 ac	Curve number	=	64*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.00 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(4.810 x 61) + (1.350 x 74) + (0.240 x 70)] / 6.400



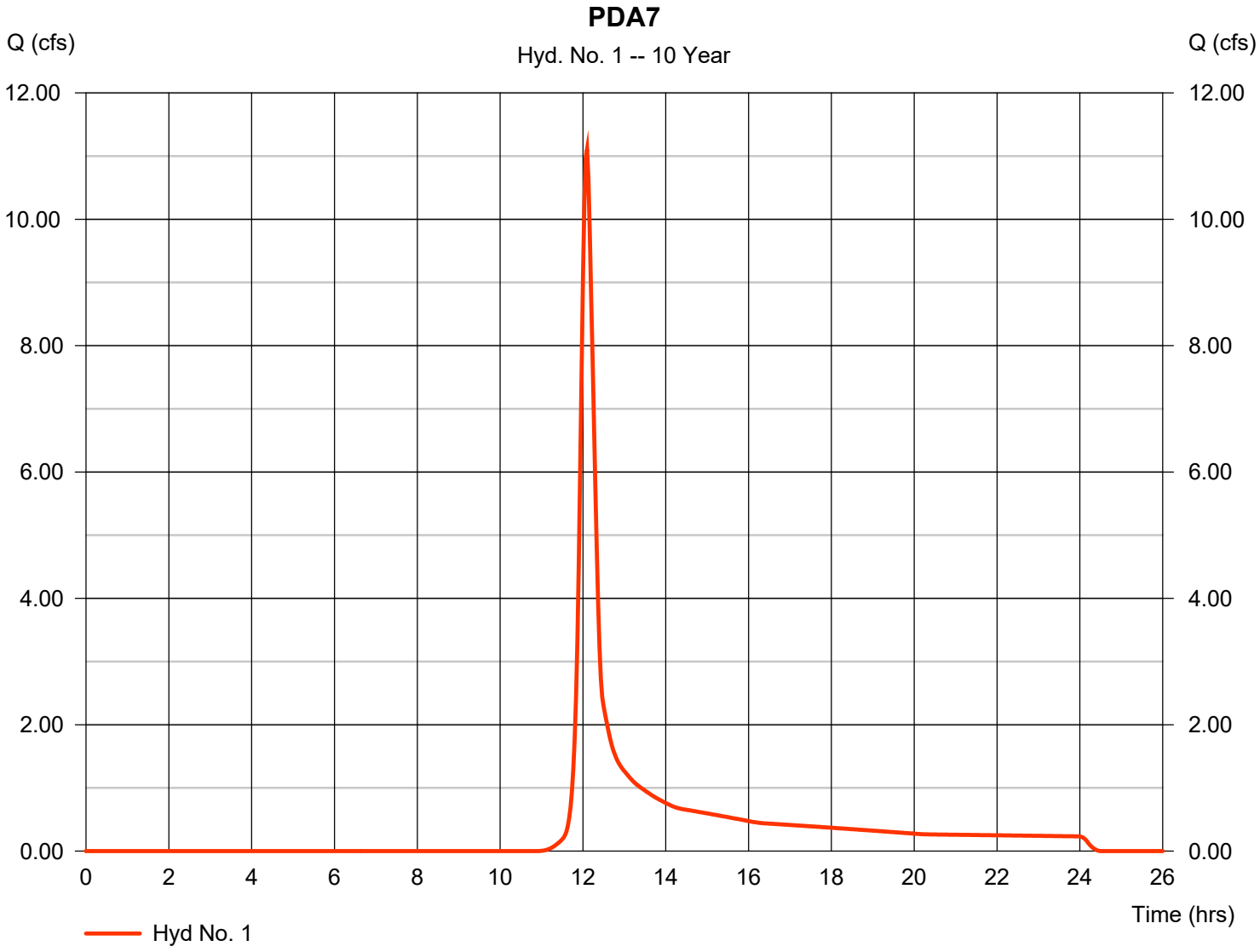
Hydrograph Report

Hyd. No. 1

PDA7

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.11 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	36,720 cuft
Drainage area	=	6.400 ac	Curve number	=	64*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(4.810 x 61) + (1.350 x 74) + (0.240 x 70)] / 6.400



Hydrograph Report

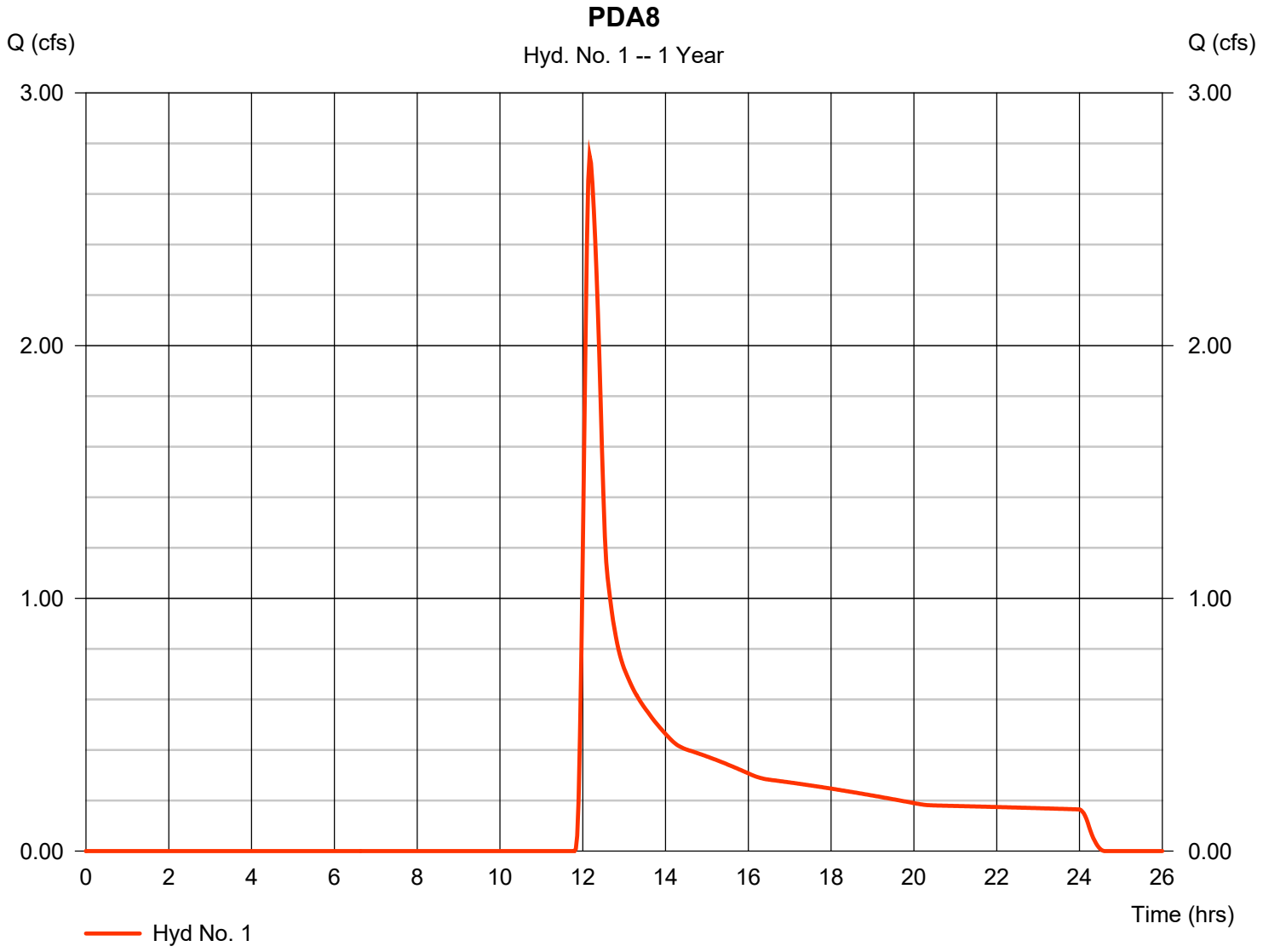
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA8

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.751 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	16,848 cuft
Drainage area	=	14.500 ac	Curve number	=	63*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.50 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(10.410 x 61) + (2.010 x 74) + (1.310 x 55) + (0.770 x 70)] / 14.500



Hydrograph Report

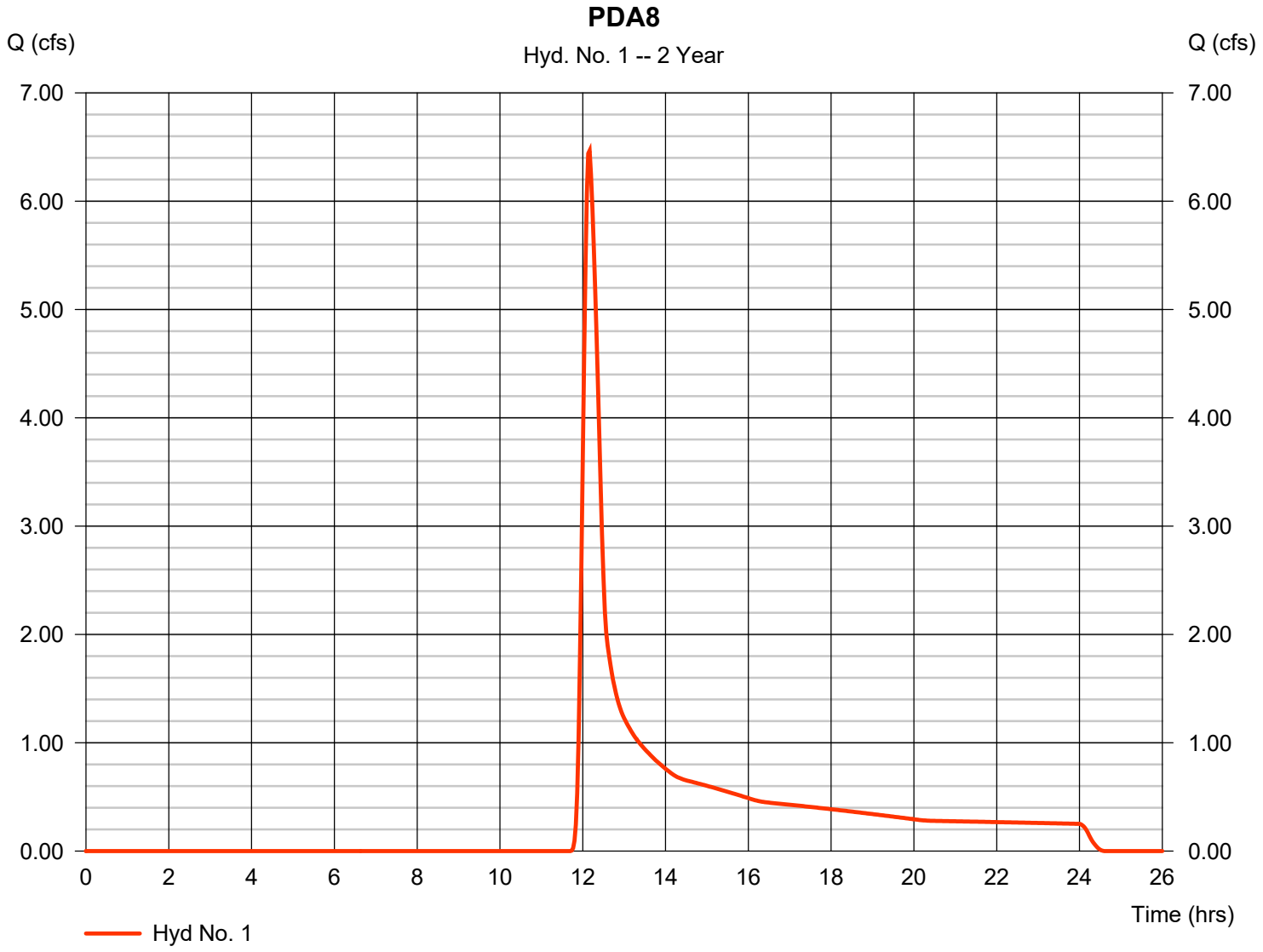
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA8

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.467 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	30,258 cuft
Drainage area	=	14.500 ac	Curve number	=	63*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.50 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(10.410 x 61) + (2.010 x 74) + (1.310 x 55) + (0.770 x 70)] / 14.500



Hydrograph Report

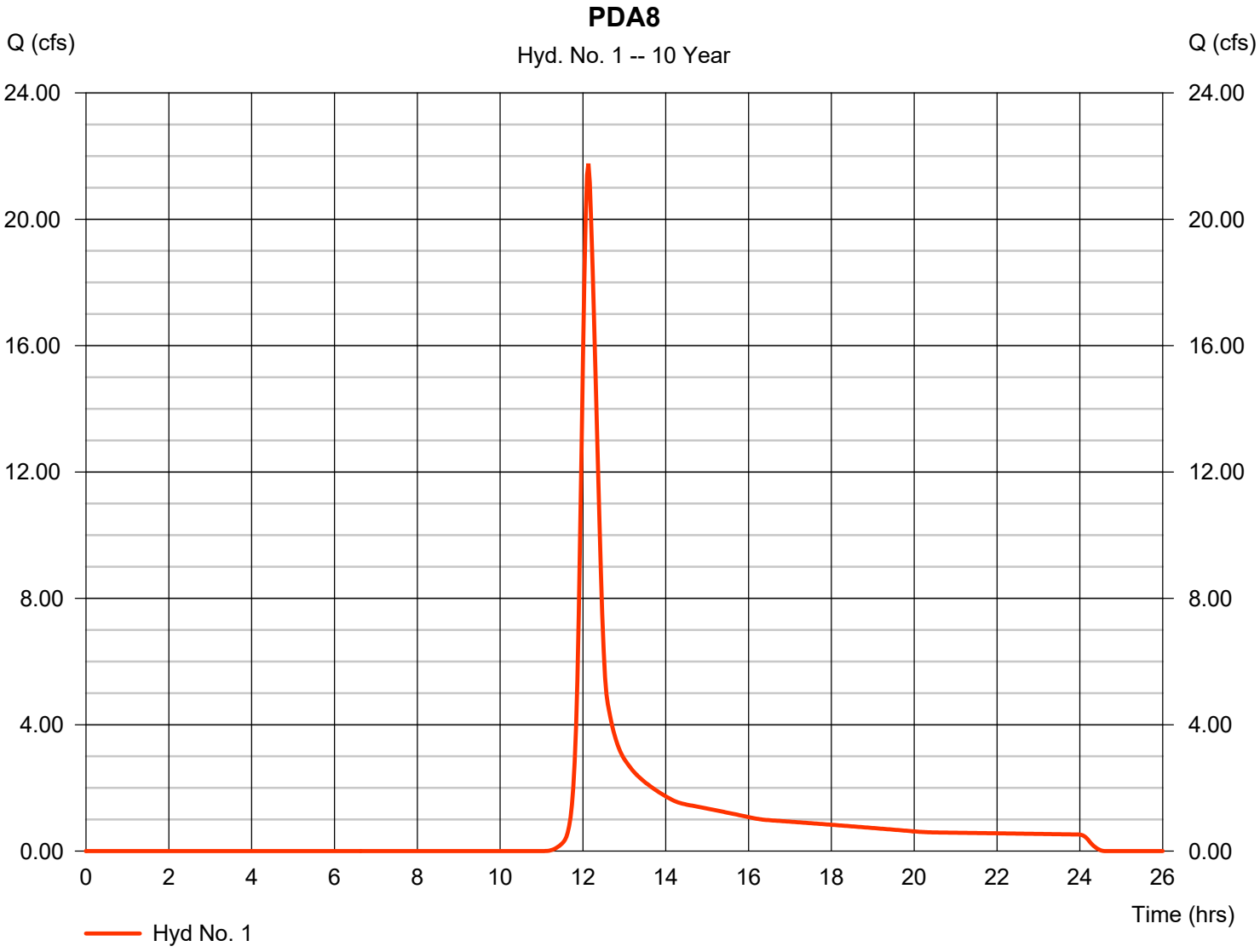
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA8

Hydrograph type	=	SCS Runoff	Peak discharge	=	21.76 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	80,838 cuft
Drainage area	=	14.500 ac	Curve number	=	63*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(10.410 x 61) + (2.010 x 74) + (1.310 x 55) + (0.770 x 70)] / 14.500



Hydrograph Report

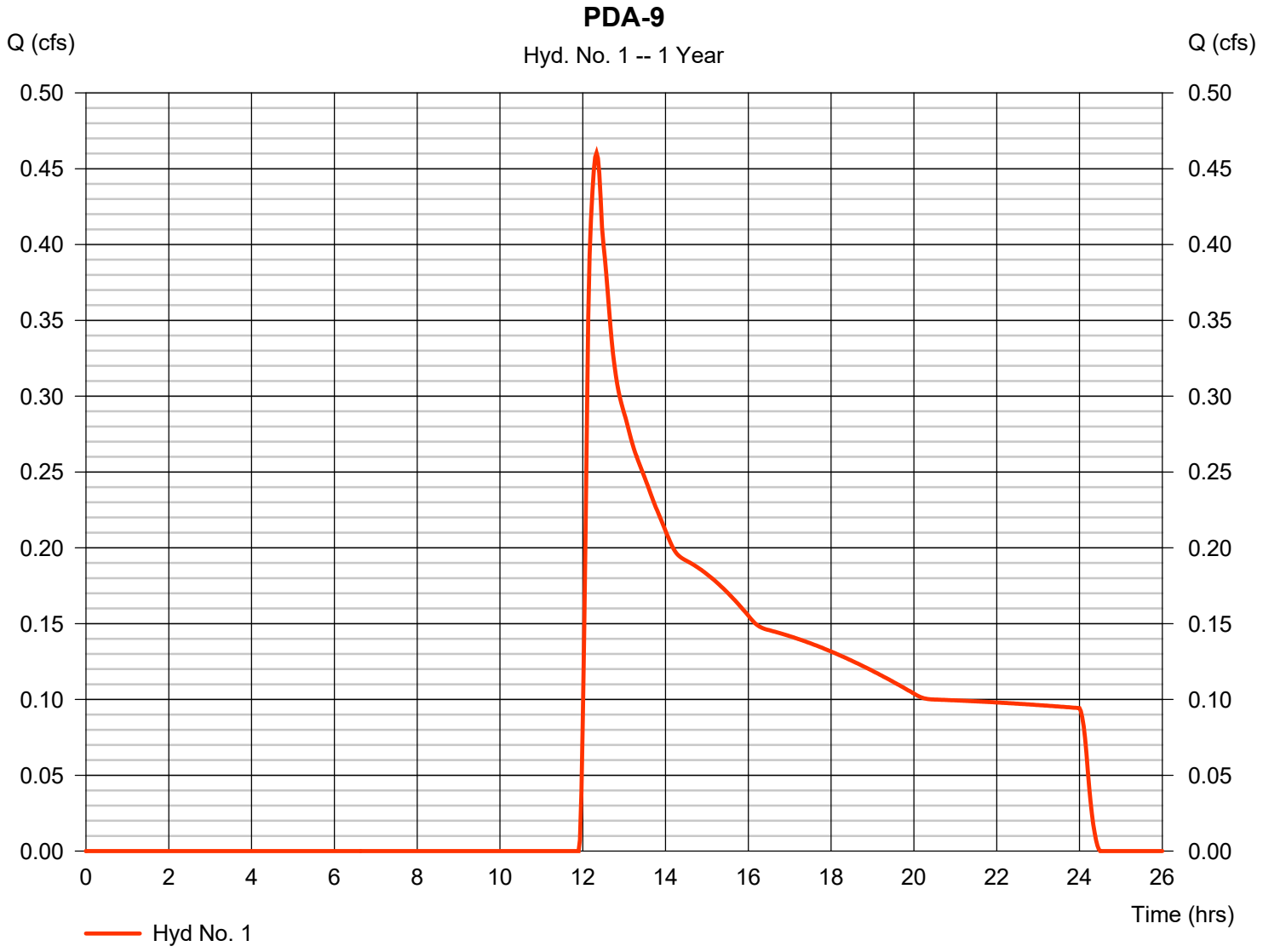
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA-9

Hydrograph type	= SCS Runoff	Peak discharge	= 0.460 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 6,834 cuft
Drainage area	= 13.300 ac	Curve number	= 56*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.50 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(12.730 x 55) + (0.570 x 70)] / 13.300



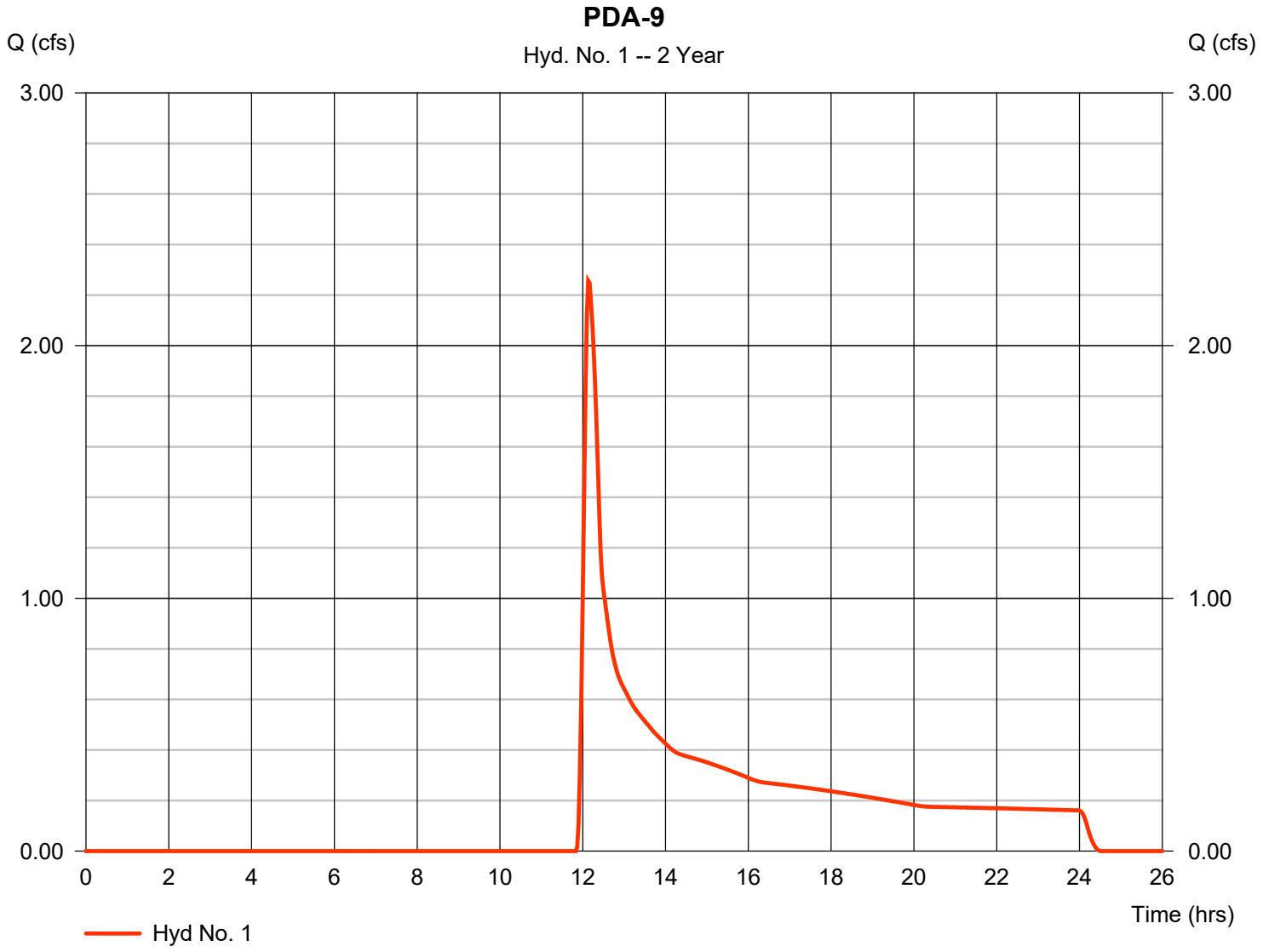
Hydrograph Report

Hyd. No. 1

PDA-9

Hydrograph type	= SCS Runoff	Peak discharge	= 2.257 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 15,046 cuft
Drainage area	= 13.300 ac	Curve number	= 56*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.50 min
Total precip.	= 3.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(12.730 x 55) + (0.570 x 70)] / 13.300



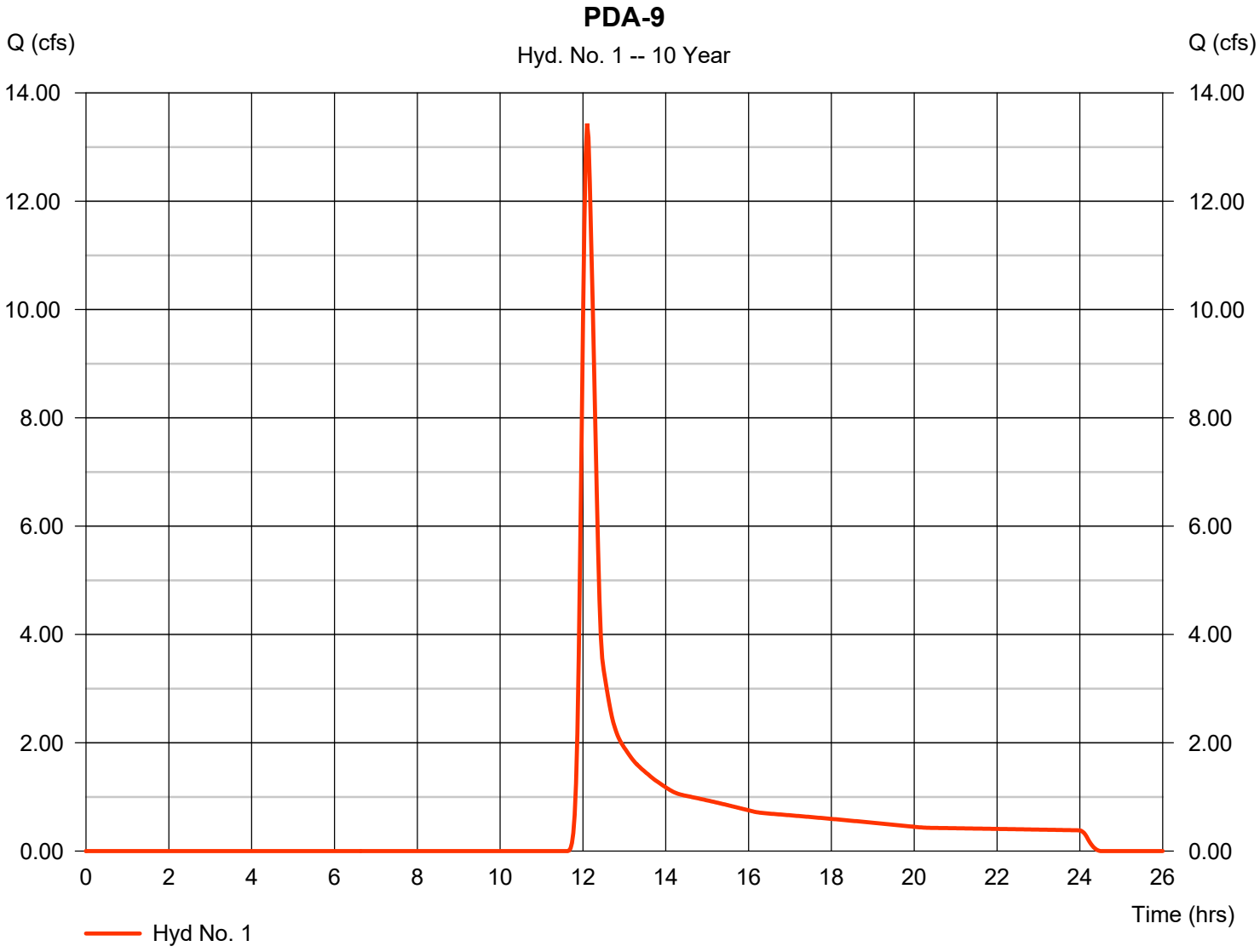
Hydrograph Report

Hyd. No. 1

PDA-9

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.43 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	50,282 cuft
Drainage area	=	13.300 ac	Curve number	=	56*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(12.730 x 55) + (0.570 x 70)] / 13.300



Hydrograph Report

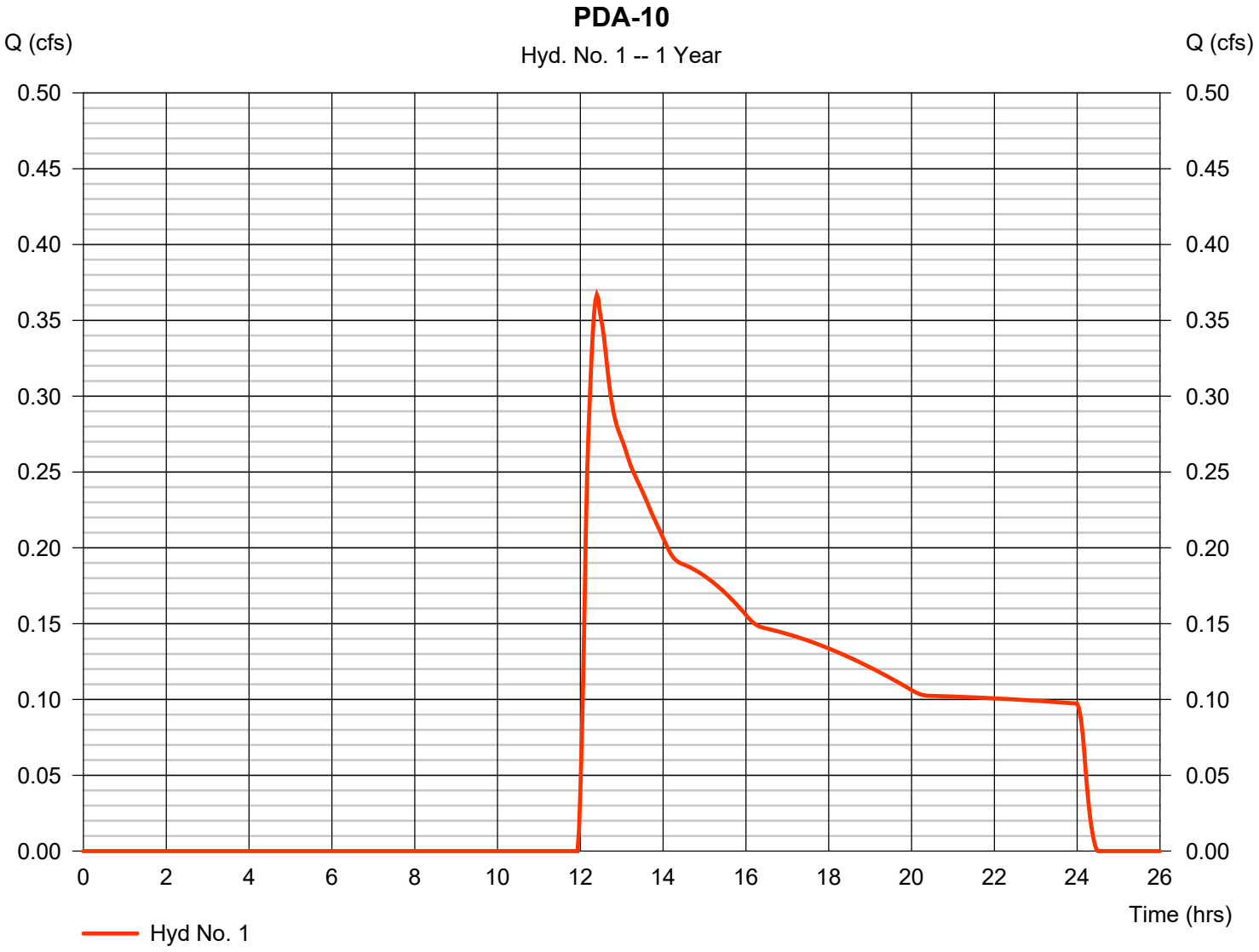
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Friday, 03 / 13 / 2020

Hyd. No. 1

PDA-10

Hydrograph type	= SCS Runoff	Peak discharge	= 0.367 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 6,613 cuft
Drainage area	= 14.900 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(14.690 x 55) + (0.210 x 61)] / 14.900



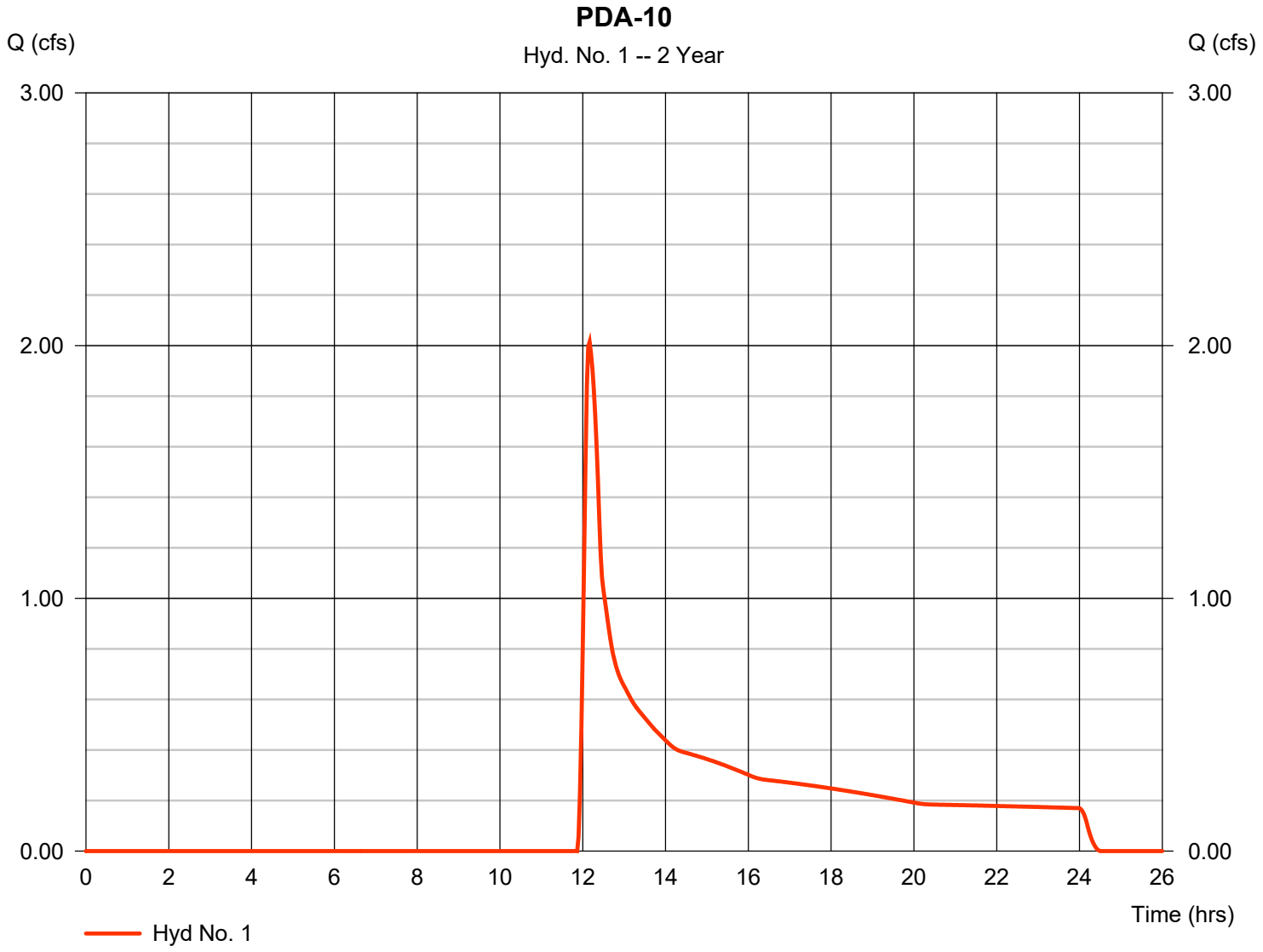
Hydrograph Report

Hyd. No. 1

PDA-10

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.015 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	15,179 cuft
Drainage area	=	14.900 ac	Curve number	=	55*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.00 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(14.690 x 55) + (0.210 x 61)] / 14.900



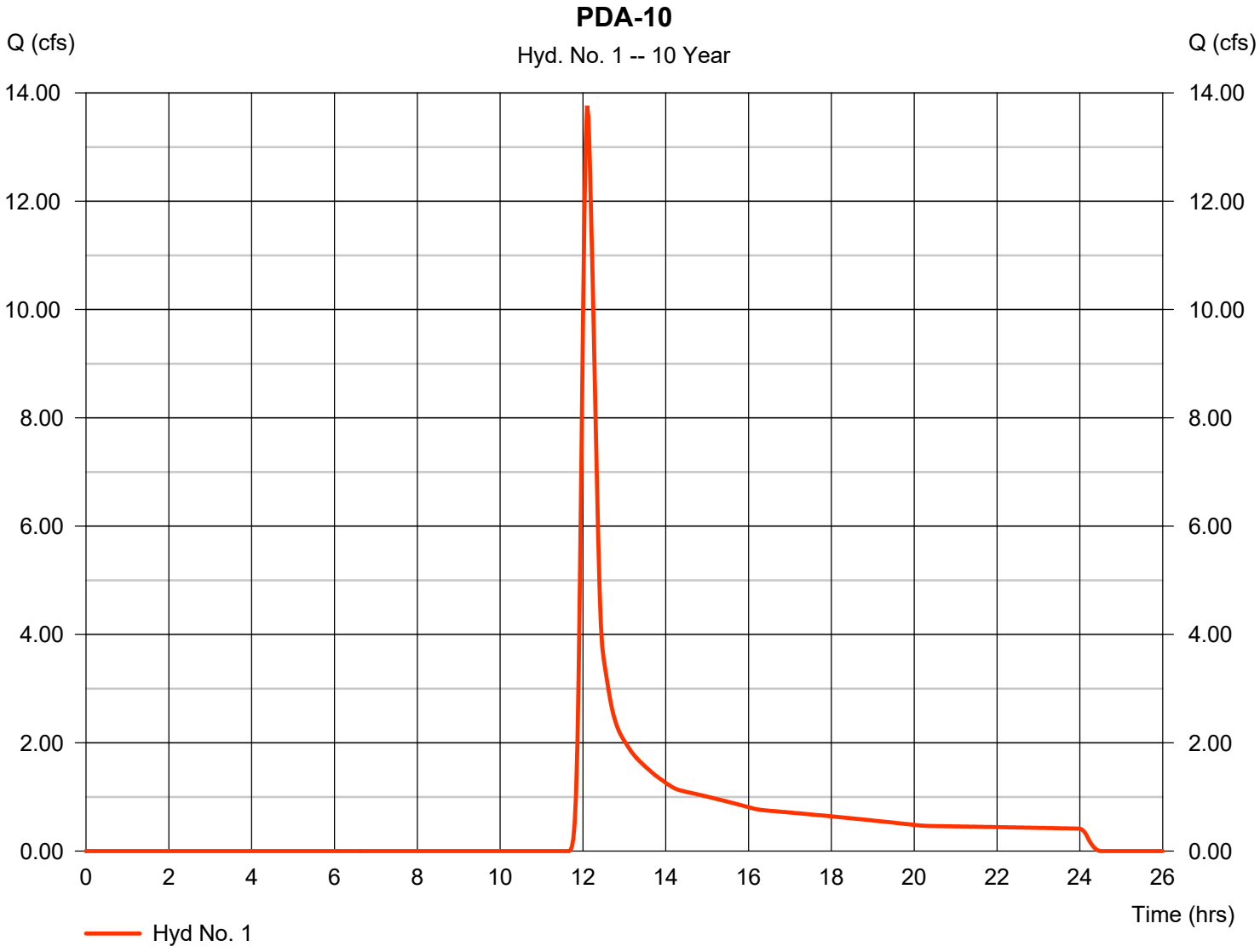
Hydrograph Report

Hyd. No. 1

PDA-10

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.76 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	52,994 cuft
Drainage area	=	14.900 ac	Curve number	=	55*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(14.690 x 55) + (0.210 x 61)] / 14.900



ATTACHMENT 3
POSTDEVELOPMENT CALCULATIONS

Hydrograph Report

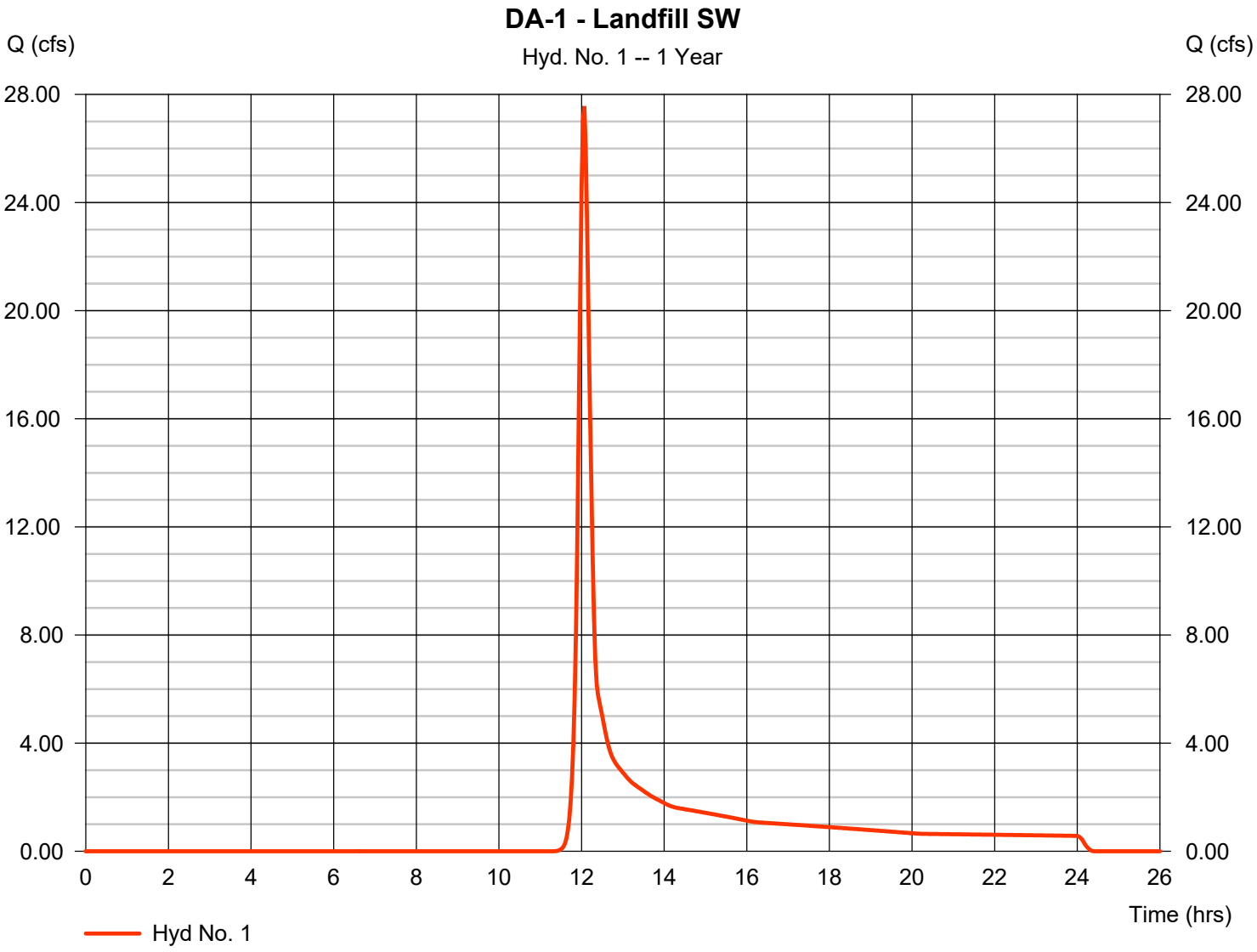
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-1 - Landfill SW

Hydrograph type	= SCS Runoff	Peak discharge	= 27.57 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 83,521 cuft
Drainage area	= 32.600 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.50 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.100 x 55) + (0.400 x 70) + (32.100 x 74)] / 32.600



Hydrograph Report

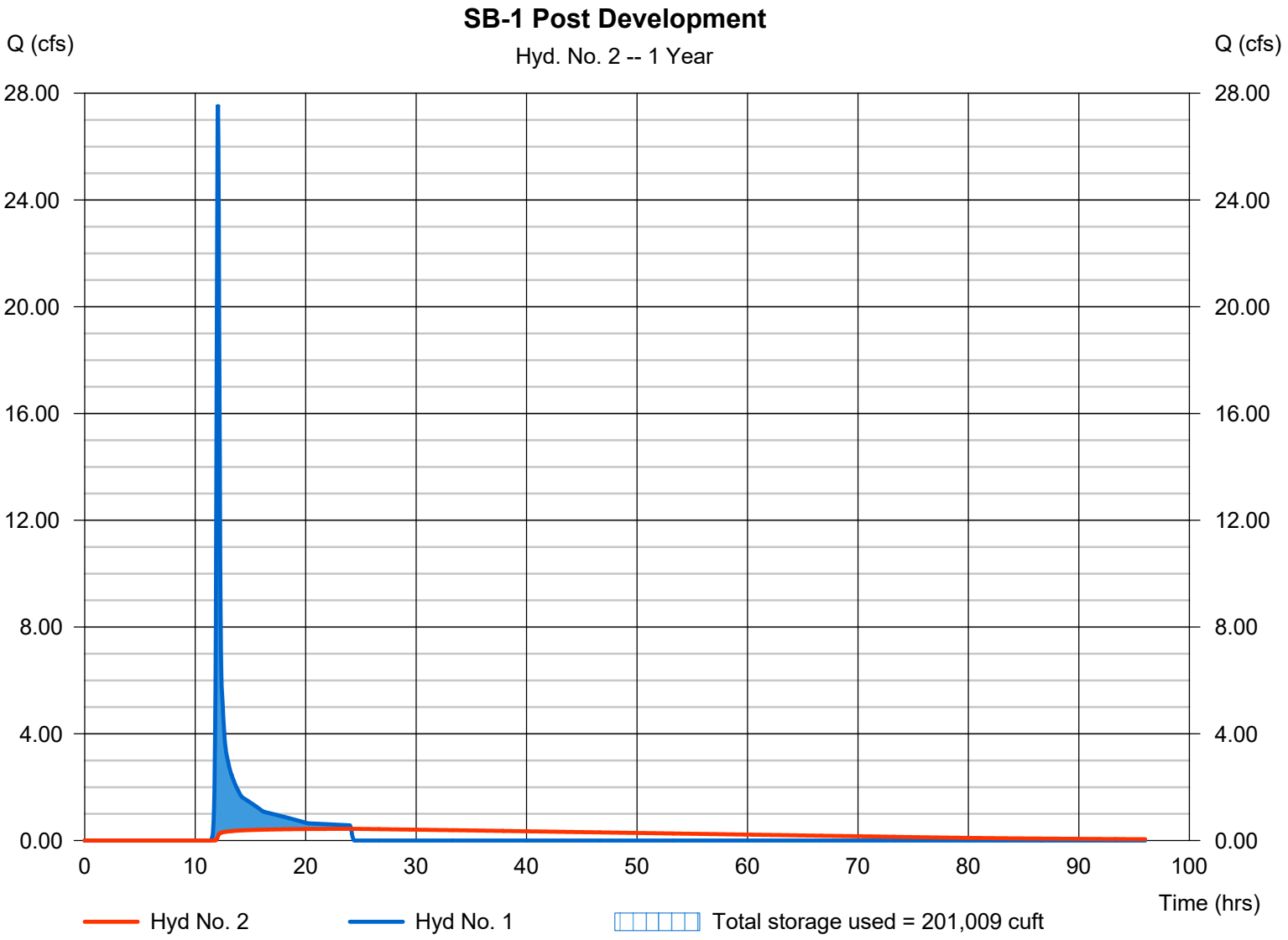
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 2

SB-1 Post Development

Hydrograph type	= Reservoir	Peak discharge	= 0.440 cfs
Storm frequency	= 1 yrs	Time to peak	= 24.10 hrs
Time interval	= 2 min	Hyd. volume	= 76,254 cuft
Inflow hyd. No.	= 1 - DA-1 - Landfill SW	Max. Elevation	= 334.26 ft
Reservoir name	= Basin 1 for DA-1 Revised	Max. Storage	= 201,009 cuft

Storage Indication method used. Wet pond routing start elevation = 333.00 ft.



Pond Report

Pond No. 1 - Basin 1 for DA-1 Revised

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 330.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	330.00	40,647	0	0
2.00	332.00	46,590	87,237	87,237
3.00	333.00	49,561	48,076	135,313
4.00	334.00	52,534	51,048	186,360
6.00	336.00	58,477	111,011	297,371
8.00	338.00	64,420	122,897	420,268
10.00	340.00	70,364	134,784	555,052
12.00	342.00	76,307	146,671	701,723

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 42.00	4.00	0.00	0.00
Span (in)	= 42.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 330.00	333.00	0.00	0.00
Length (ft)	= 140.00	1.00	0.00	0.00
Slope (%)	= 1.00	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

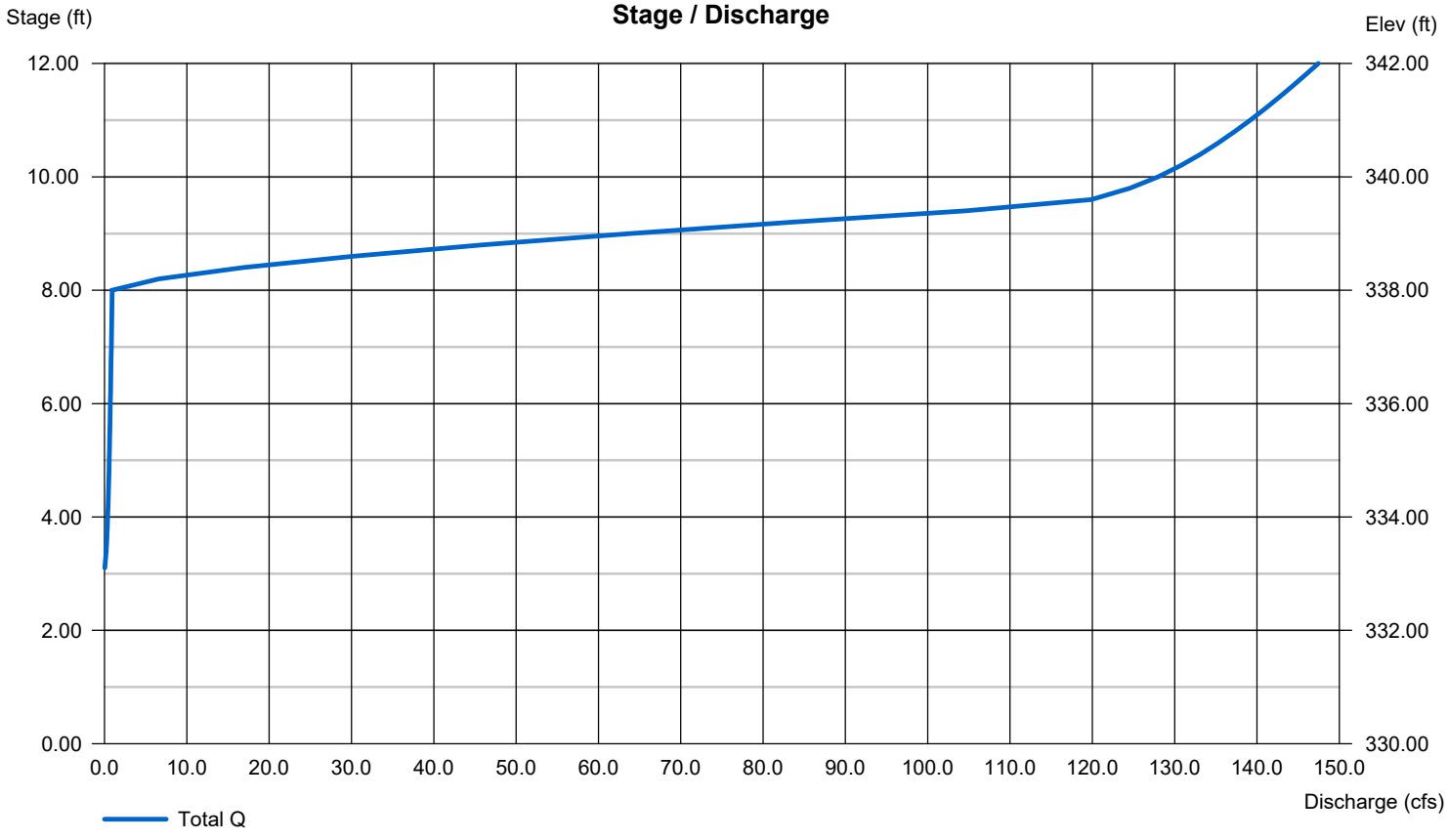
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 18.85	Inactive	0.00	0.00
Crest El. (ft)	= 338.00	328.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



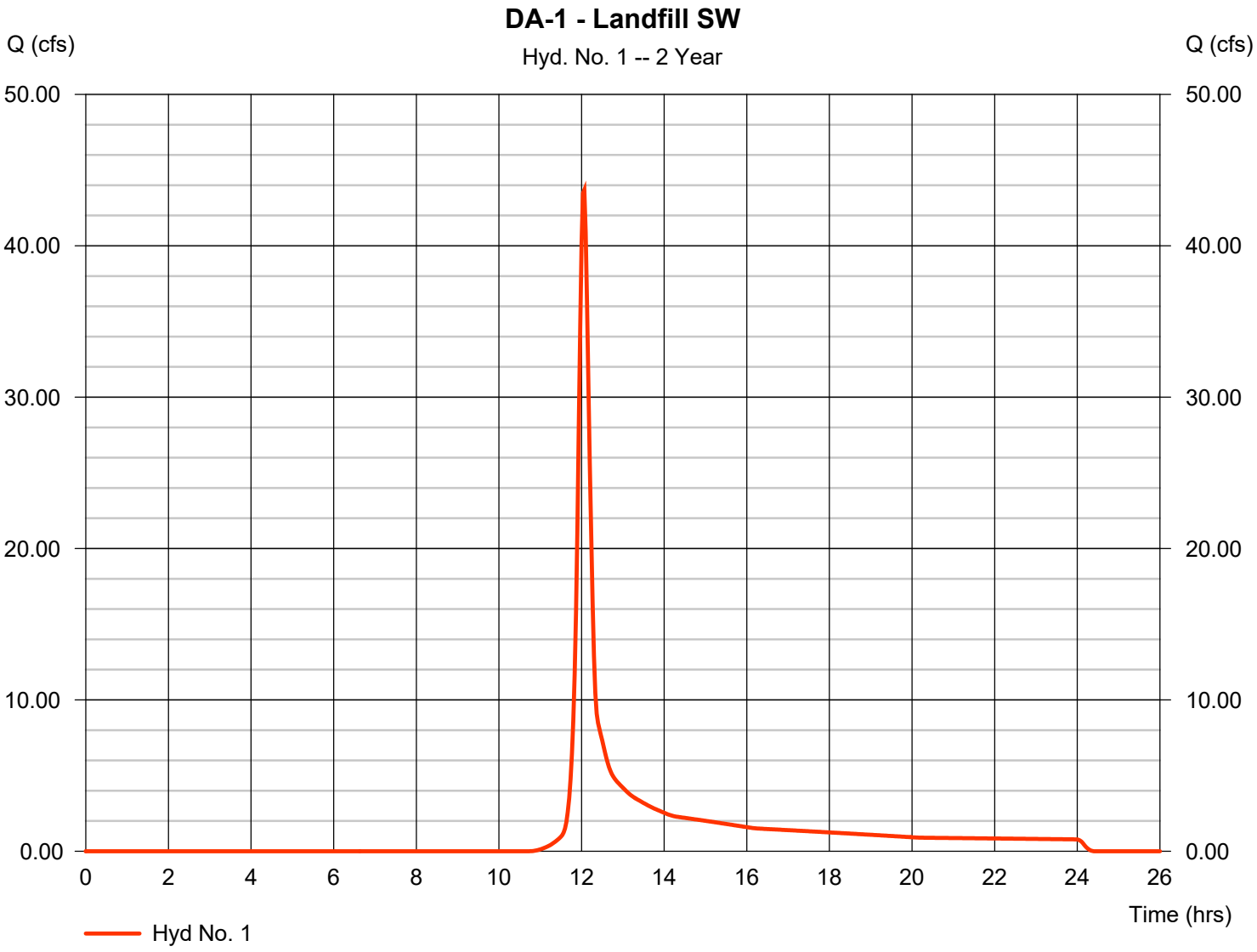
Hydrograph Report

Hyd. No. 1

DA-1 - Landfill SW

Hydrograph type	=	SCS Runoff	Peak discharge	=	43.69 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	127,372 cuft
Drainage area	=	32.600 ac	Curve number	=	74*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.50 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.100 x 55) + (0.400 x 70) + (32.100 x 74)] / 32.600



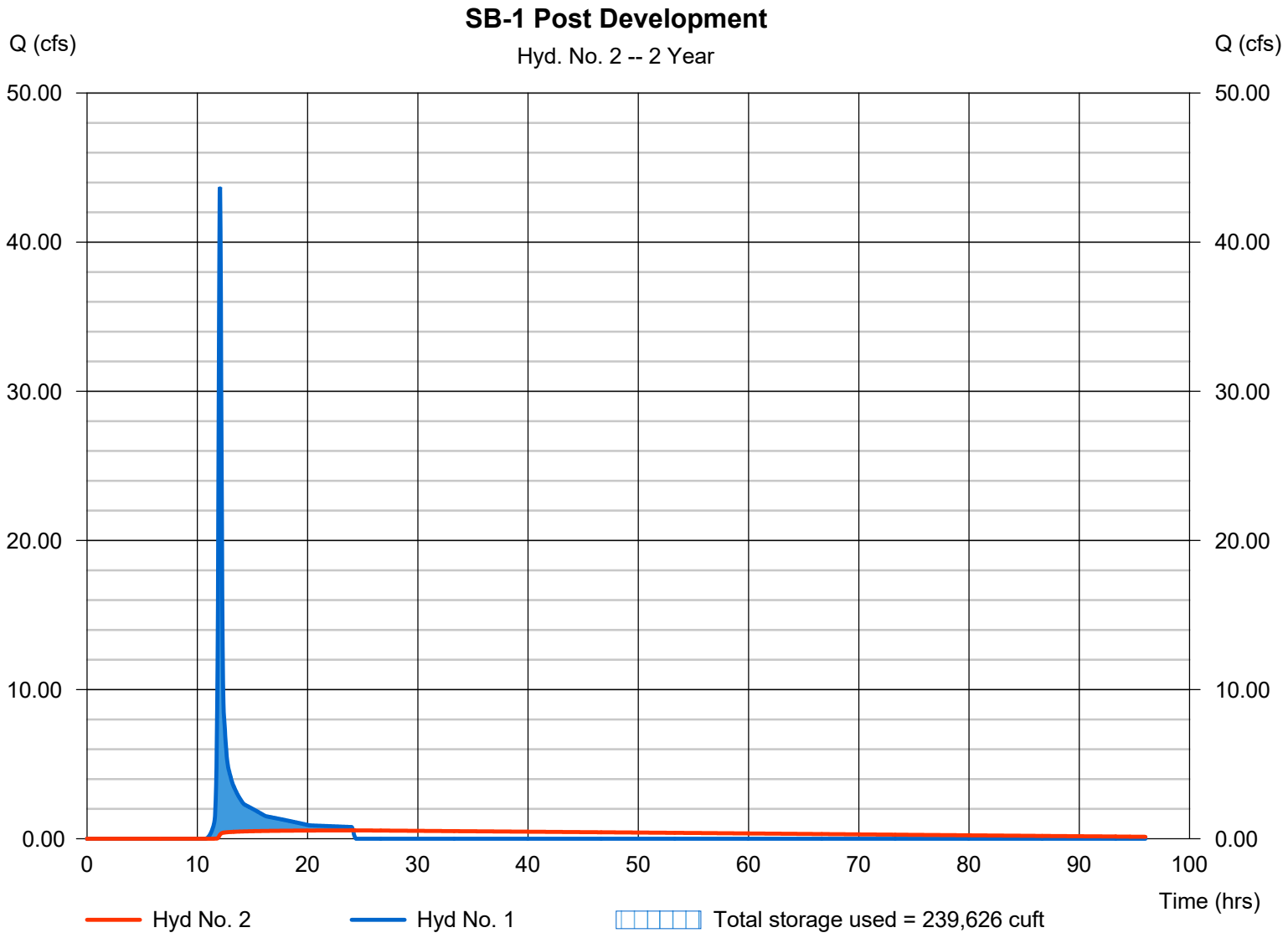
Hydrograph Report

Hyd. No. 2

SB-1 Post Development

Hydrograph type	=	Reservoir	Peak discharge	=	0.562 cfs
Storm frequency	=	2 yrs	Time to peak	=	24.13 hrs
Time interval	=	2 min	Hyd. volume	=	113,834 cuft
Inflow hyd. No.	=	1 - DA-1 - Landfill SW	Max. Elevation	=	334.96 ft
Reservoir name	=	Basin 1 for DA-1 Revised	Max. Storage	=	239,626 cuft

Storage Indication method used. Wet pond routing start elevation = 333.00 ft.



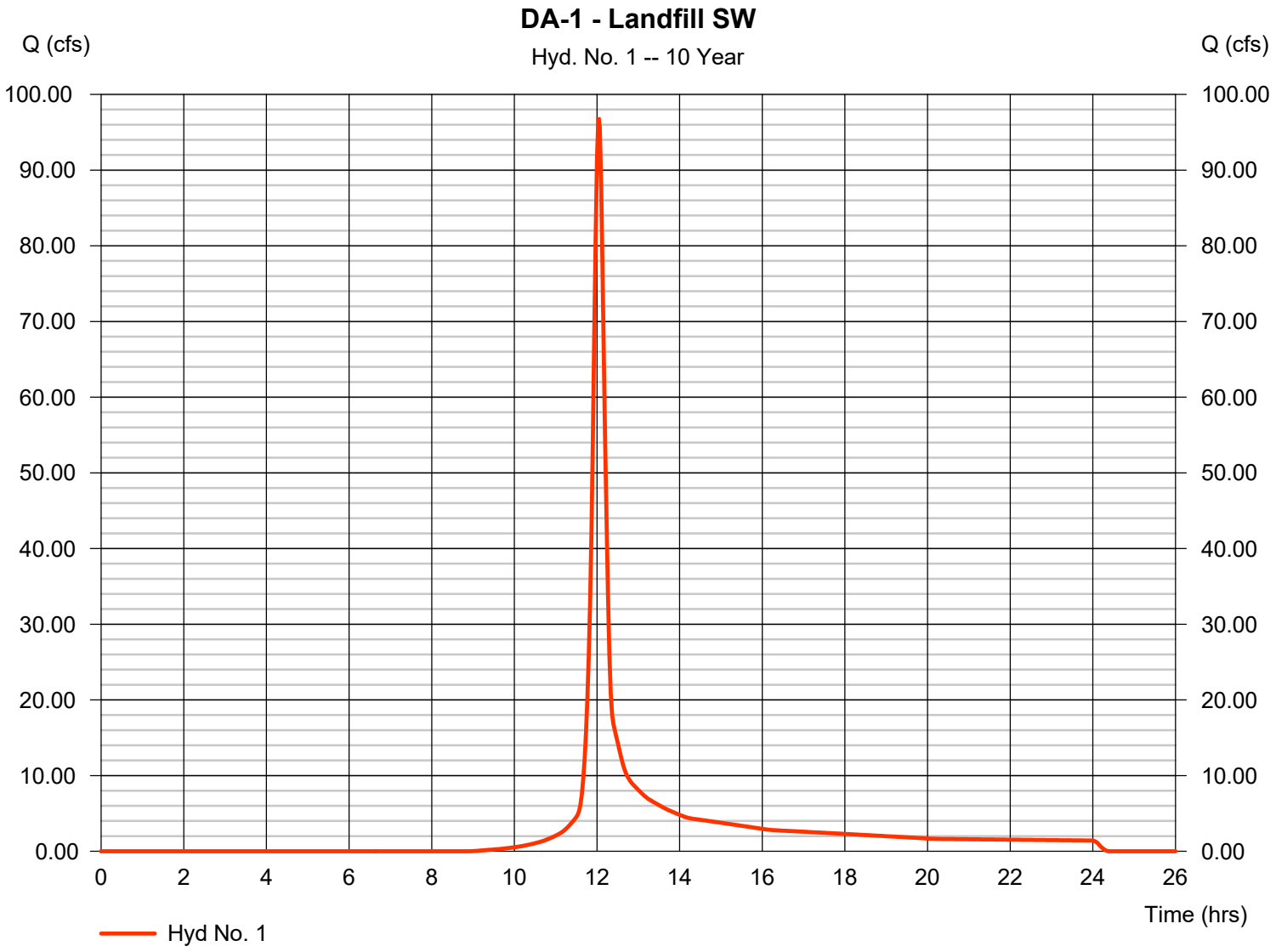
Hydrograph Report

Hyd. No. 1

DA-1 - Landfill SW

Hydrograph type	=	SCS Runoff	Peak discharge	=	96.97 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	272,787 cuft
Drainage area	=	32.600 ac	Curve number	=	74*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.100 x 55) + (0.400 x 70) + (32.100 x 74)] / 32.600



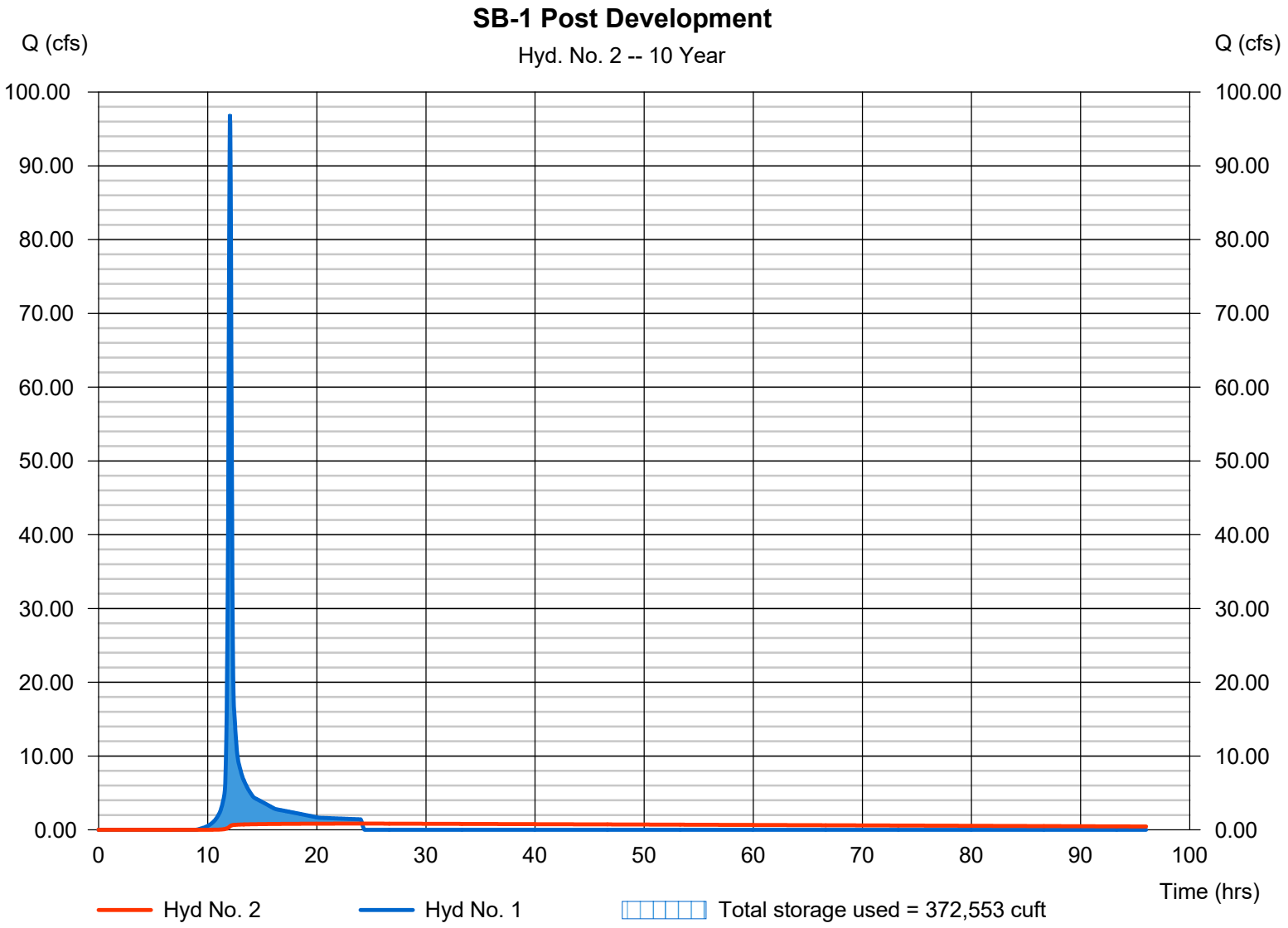
Hydrograph Report

Hyd. No. 2

SB-1 Post Development

Hydrograph type	=	Reservoir	Peak discharge	=	0.846 cfs
Storm frequency	=	10 yrs	Time to peak	=	24.17 hrs
Time interval	=	2 min	Hyd. volume	=	204,224 cuft
Inflow hyd. No.	=	1 - DA-1 - Landfill SW	Max. Elevation	=	337.22 ft
Reservoir name	=	Basin 1 for DA-1 Revised	Max. Storage	=	372,553 cuft

Storage Indication method used. Wet pond routing start elevation = 333.00 ft.



Hydrograph Report

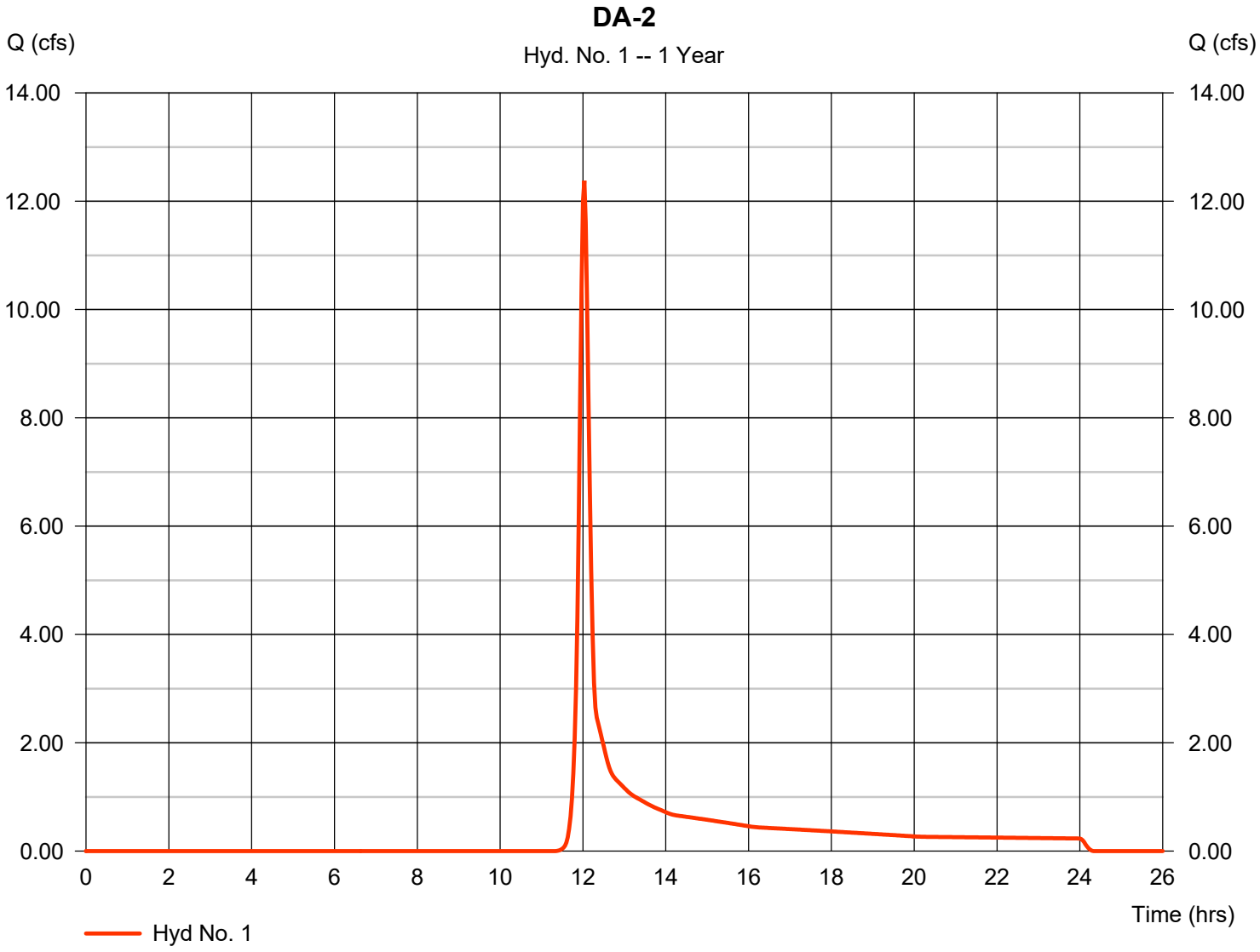
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-2

Hydrograph type	= SCS Runoff	Peak discharge	= 12.38 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 34,144 cuft
Drainage area	= 12.600 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.50 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(12.600 x 74)] / 12.600



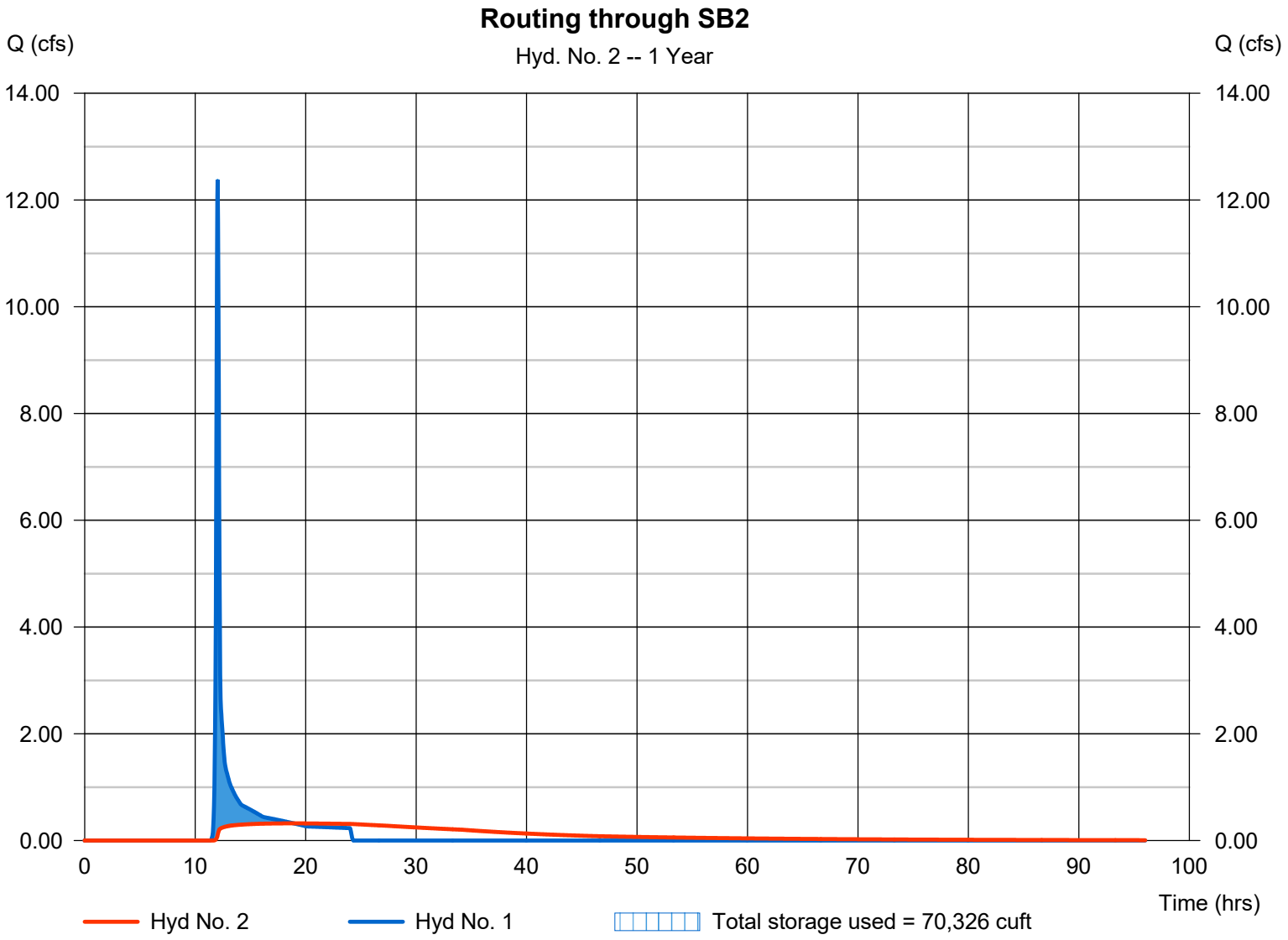
Hydrograph Report

Hyd. No. 2

Routing through SB2

Hydrograph type	= Reservoir	Peak discharge	= 0.322 cfs
Storm frequency	= 1 yrs	Time to peak	= 18.93 hrs
Time interval	= 2 min	Hyd. volume	= 33,715 cuft
Inflow hyd. No.	= 1 - DA-2	Max. Elevation	= 320.76 ft
Reservoir name	= BASIN 2	Max. Storage	= 70,326 cuft

Storage Indication method used. Wet pond routing start elevation = 320.00 ft.



Pond Report

Pond No. 1 - BASIN 2

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 318.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	318.00	21,933	0	0
2.00	320.00	26,559	48,492	48,492
4.00	322.00	31,185	57,744	106,236
6.00	324.00	35,811	66,996	173,232
8.00	326.00	40,437	76,248	249,480
10.00	328.00	45,063	85,500	334,980
12.00	330.00	49,689	94,752	429,732

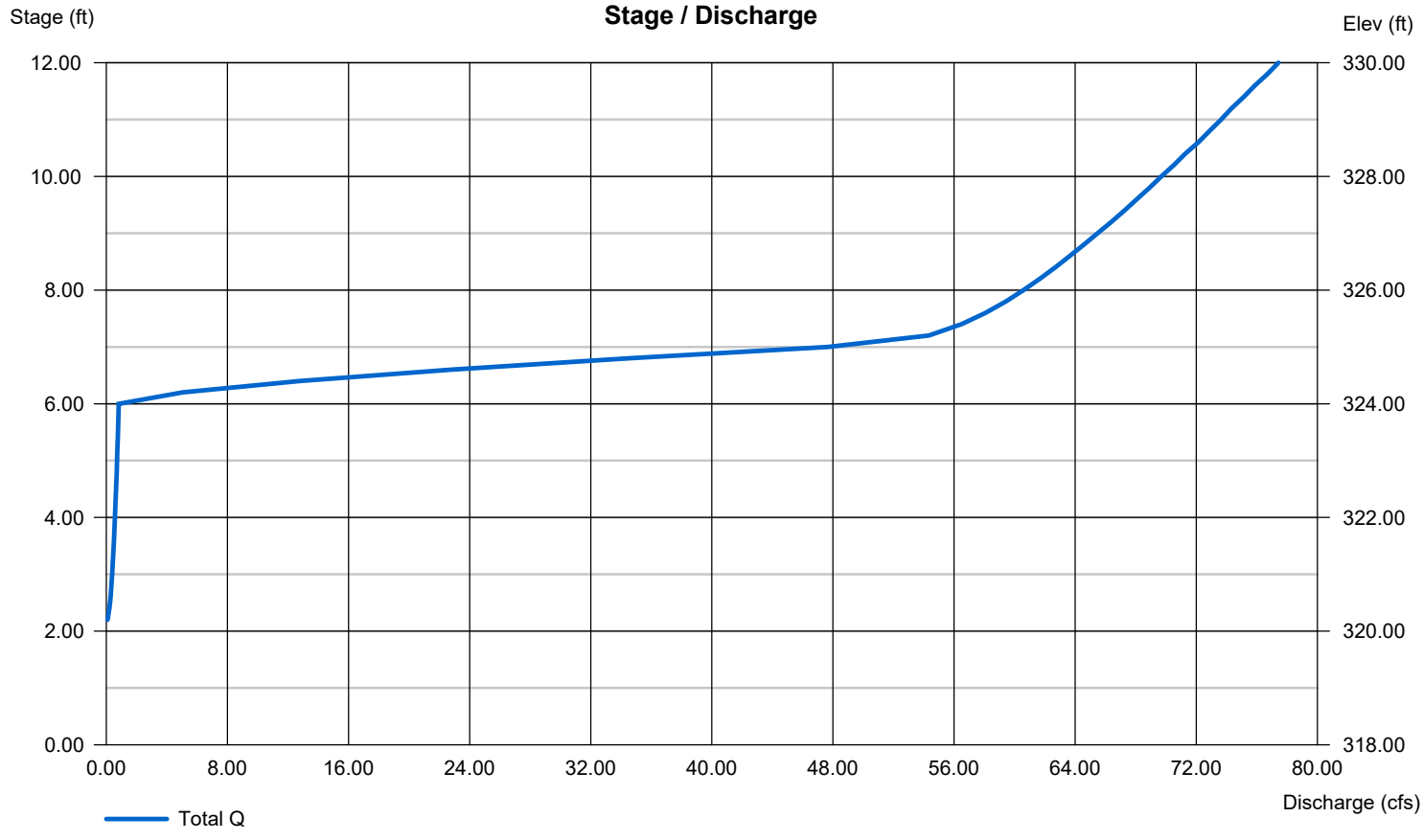
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	4.00	0.00	0.00
Span (in)	= 30.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 318.00	320.00	0.00	0.00
Length (ft)	= 90.00	1.00	0.00	0.00
Slope (%)	= 3.33	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.14	Inactive	0.00	0.00
Crest El. (ft)	= 324.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



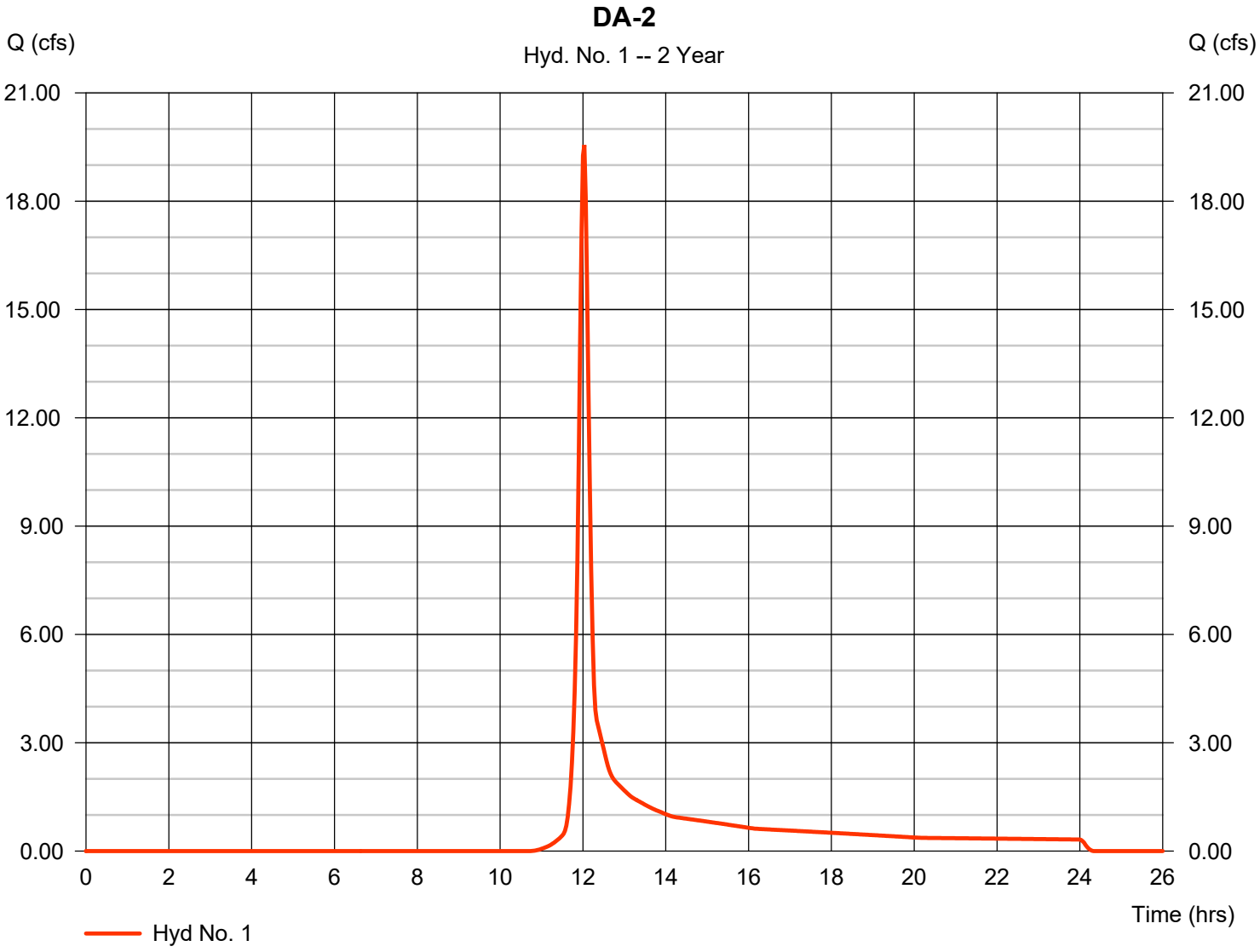
Hydrograph Report

Hyd. No. 1

DA-2

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.55 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	52,070 cuft
Drainage area	=	12.600 ac	Curve number	=	74*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.50 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(12.600 x 74)] / 12.600



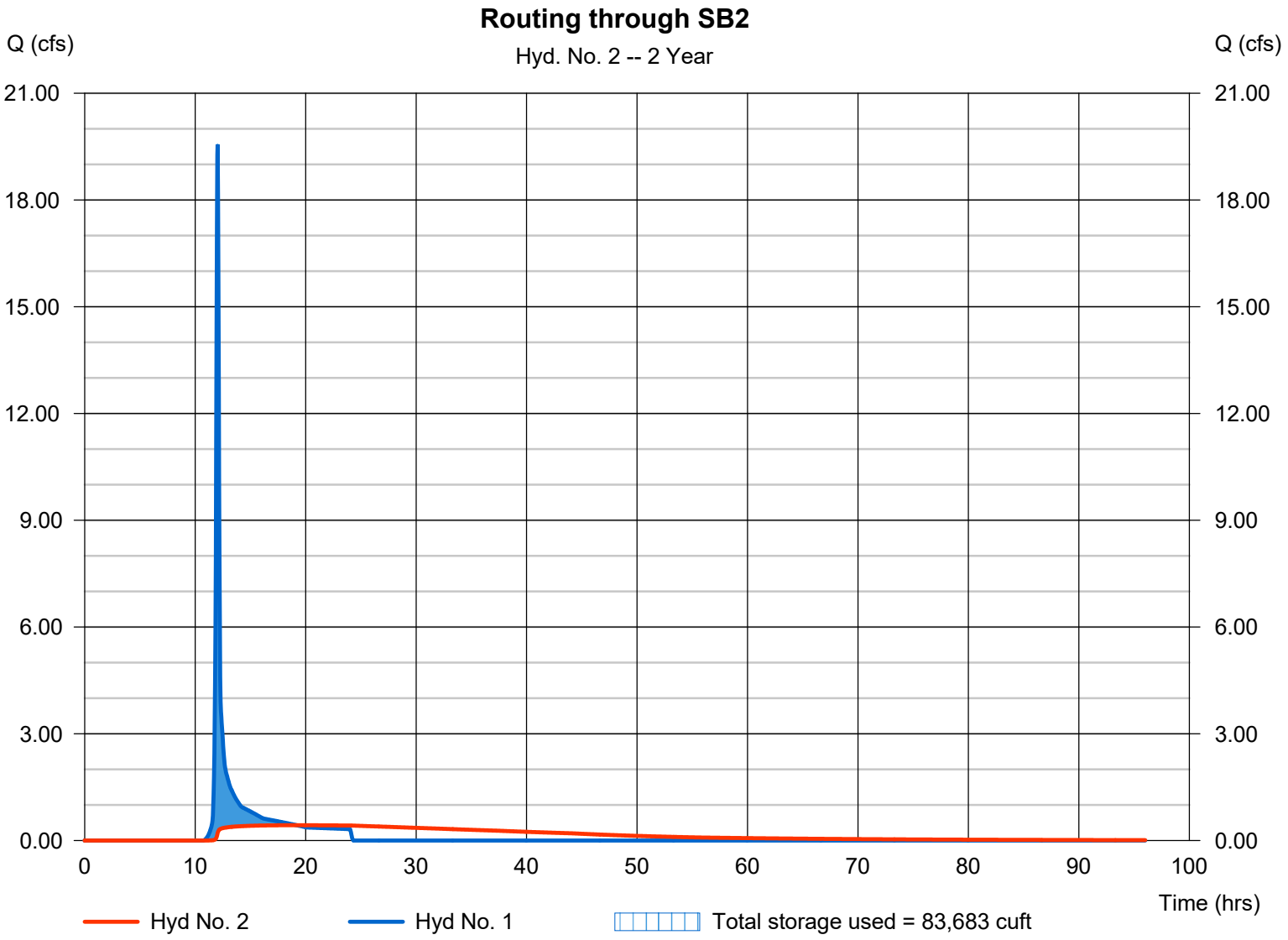
Hydrograph Report

Hyd. No. 2

Routing through SB2

Hydrograph type	= Reservoir	Peak discharge	= 0.431 cfs
Storm frequency	= 2 yrs	Time to peak	= 19.17 hrs
Time interval	= 2 min	Hyd. volume	= 51,349 cuft
Inflow hyd. No.	= 1 - DA-2	Max. Elevation	= 321.22 ft
Reservoir name	= BASIN 2	Max. Storage	= 83,683 cuft

Storage Indication method used. Wet pond routing start elevation = 320.00 ft.



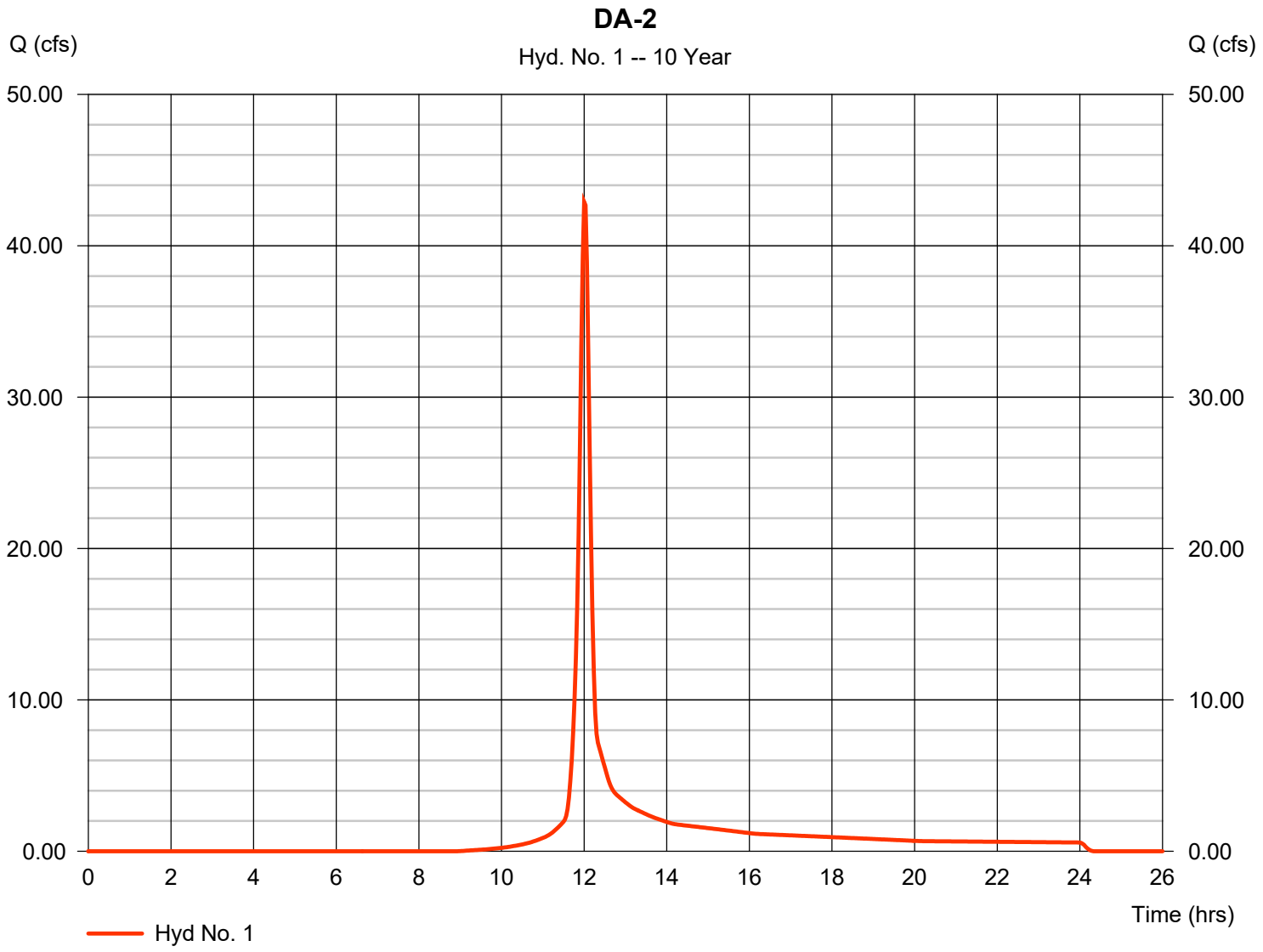
Hydrograph Report

Hyd. No. 1

DA-2

Hydrograph type	=	SCS Runoff	Peak discharge	=	42.89 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	111,516 cuft
Drainage area	=	12.600 ac	Curve number	=	74*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(12.600 x 74)] / 12.600



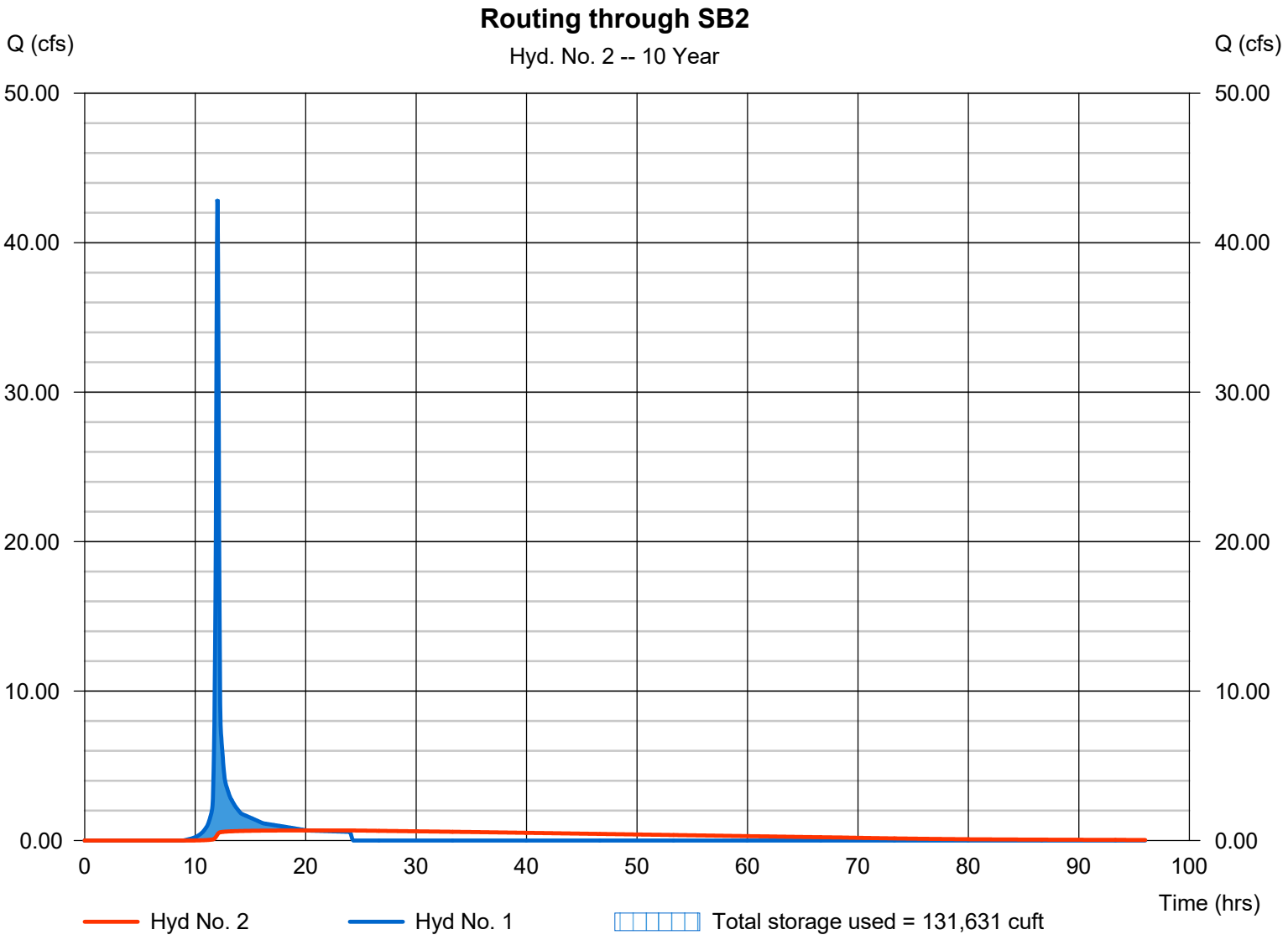
Hydrograph Report

Hyd. No. 2

Routing through SB2

Hydrograph type	= Reservoir	Peak discharge	= 0.676 cfs
Storm frequency	= 10 yrs	Time to peak	= 20.10 hrs
Time interval	= 2 min	Hyd. volume	= 108,950 cuft
Inflow hyd. No.	= 1 - DA-2	Max. Elevation	= 322.76 ft
Reservoir name	= BASIN 2	Max. Storage	= 131,631 cuft

Storage Indication method used. Wet pond routing start elevation = 320.00 ft.



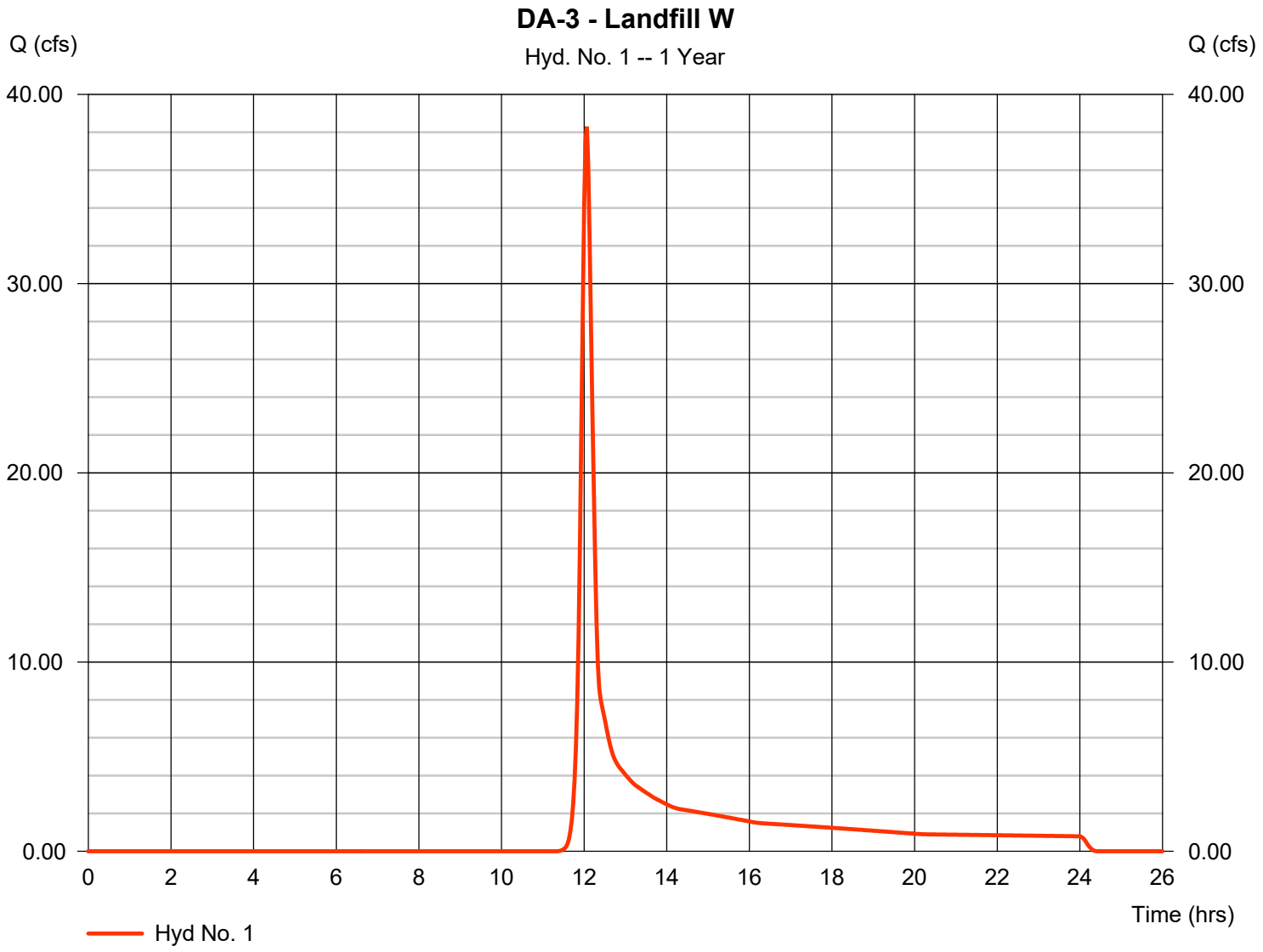
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-3 - Landfill W

Hydrograph type	= SCS Runoff	Peak discharge	= 38.31 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 116,059 cuft
Drainage area	= 45.300 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

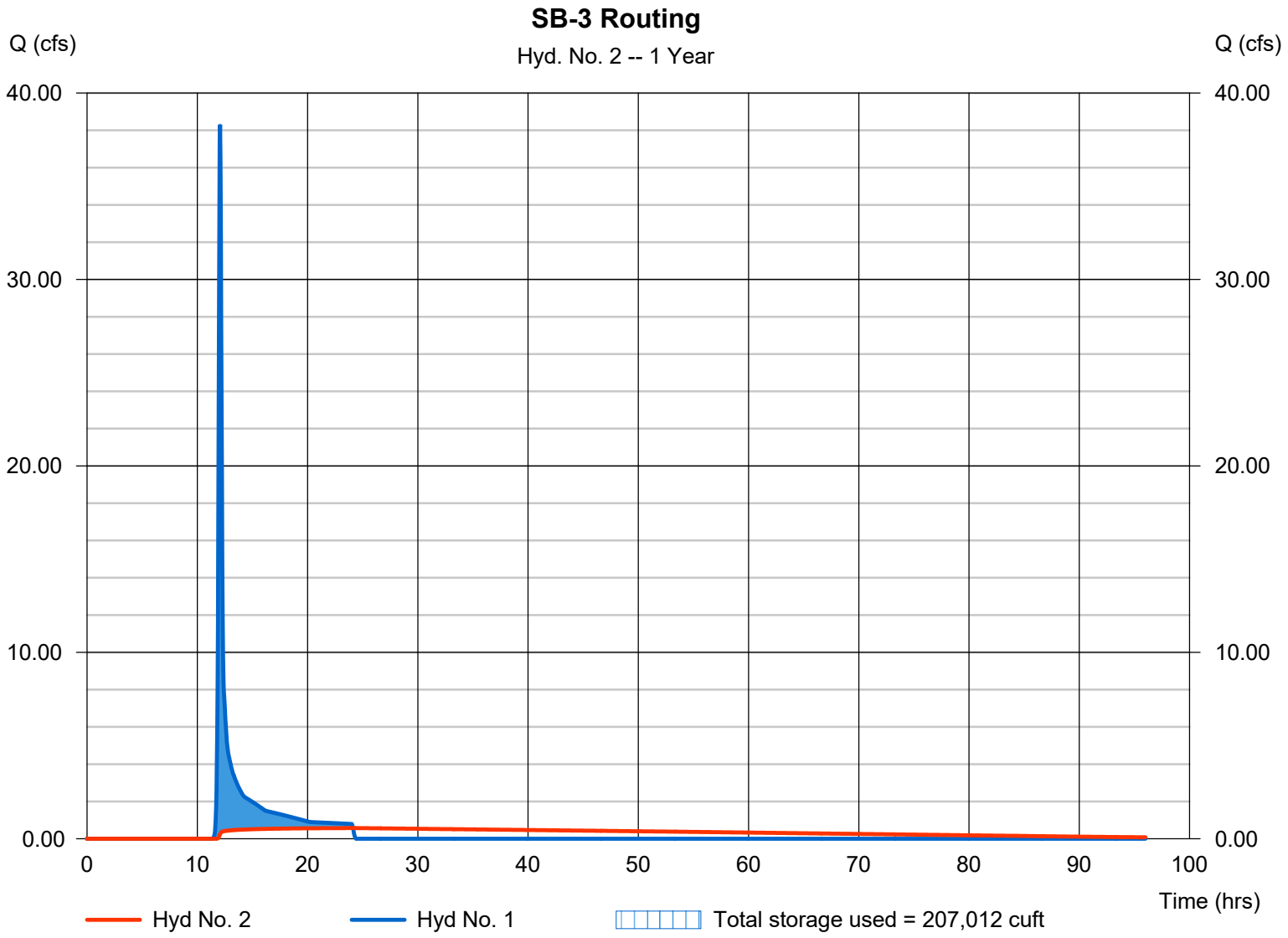
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 2

SB-3 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.573 cfs
Storm frequency	= 1 yrs	Time to peak	= 24.13 hrs
Time interval	= 2 min	Hyd. volume	= 107,673 cuft
Inflow hyd. No.	= 1 - DA-3 - Landfill W	Max. Elevation	= 325.03 ft
Reservoir name	= Basin 3	Max. Storage	= 207,012 cuft

Storage Indication method used. Wet pond routing start elevation = 323.00 ft.



Pond Report

Pond No. 1 - Basin 3

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 320.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	320.00	33,953	0	0
2.00	322.00	39,459	73,412	73,412
3.00	323.00	42,212	40,836	114,248
4.00	324.00	44,965	43,589	157,836
6.00	326.00	50,472	95,437	253,273
8.00	328.00	55,978	106,450	359,723
10.00	330.00	61,484	117,462	477,185
12.00	332.00	66,990	128,474	605,659

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 48.00	4.00	0.00	0.00
Span (in)	= 48.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 320.00	323.00	0.00	0.00
Length (ft)	= 145.00	1.00	0.00	0.00
Slope (%)	= 5.50	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

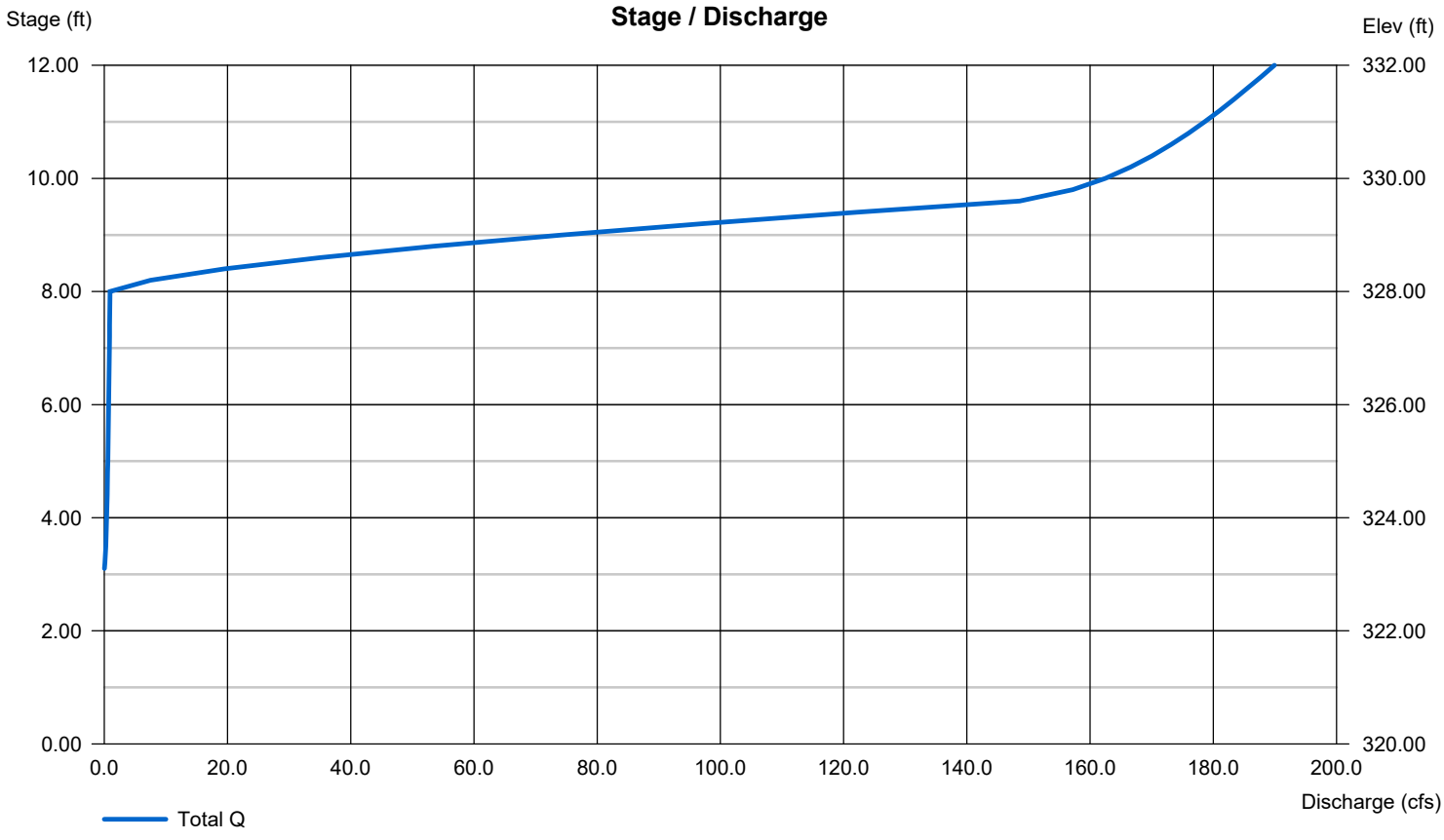
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 21.99	Inactive	0.00	0.00
Crest El. (ft)	= 328.00	328.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

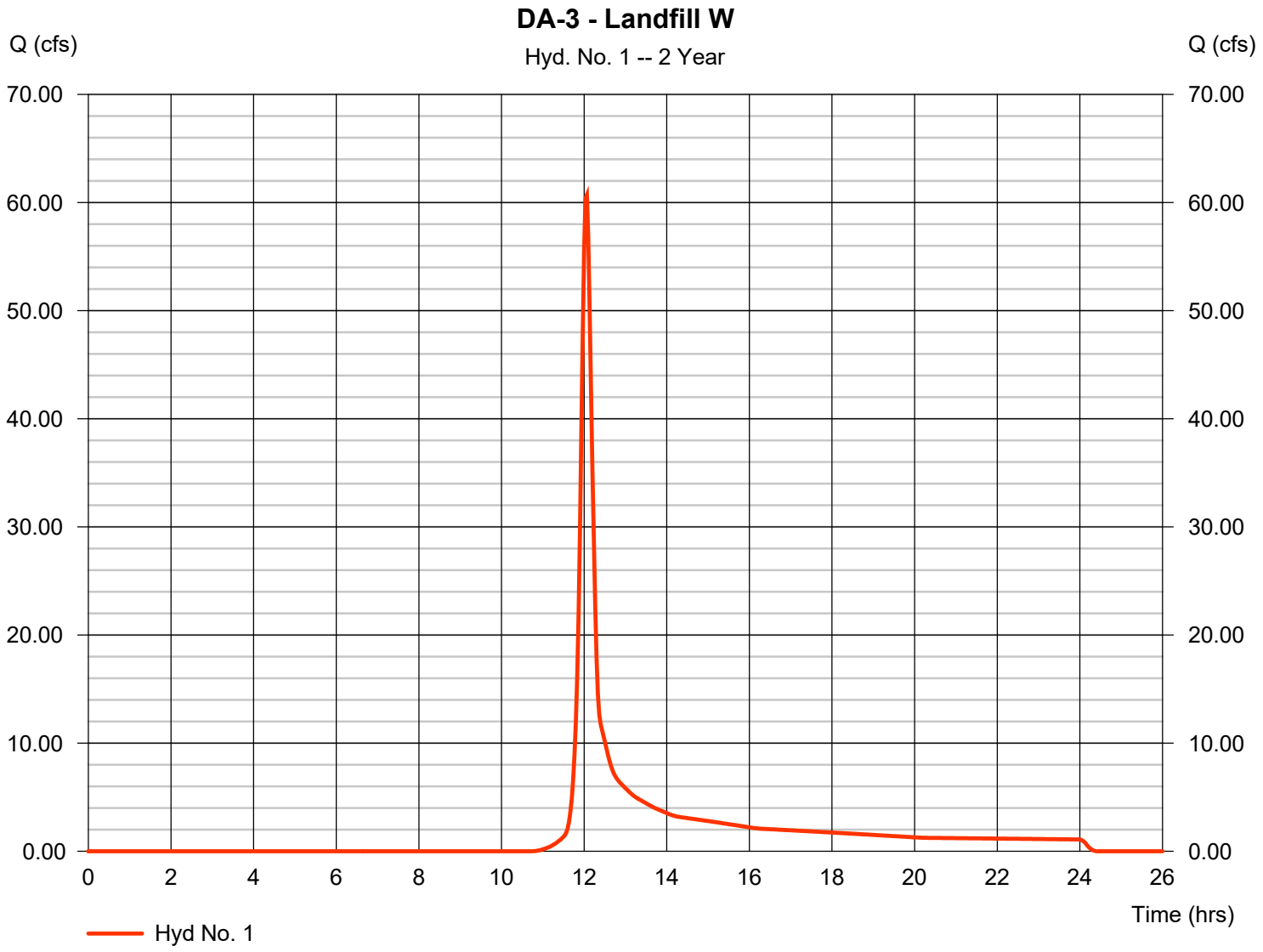


Hydrograph Report

Hyd. No. 1

DA-3 - Landfill W

Hydrograph type	=	SCS Runoff	Peak discharge	=	60.71 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	176,992 cuft
Drainage area	=	45.300 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



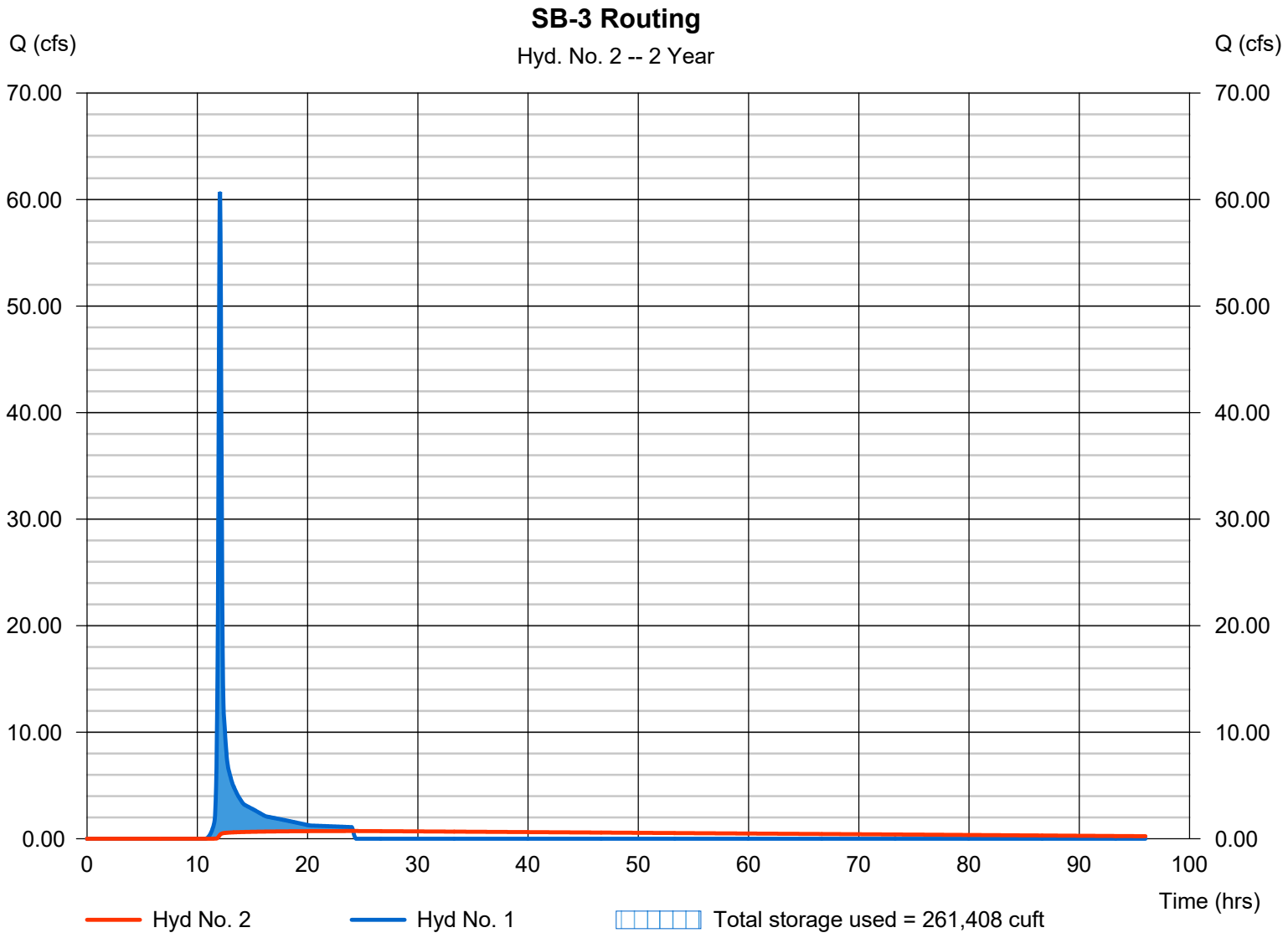
Hydrograph Report

Hyd. No. 2

SB-3 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.726 cfs
Storm frequency	= 2 yrs	Time to peak	= 24.13 hrs
Time interval	= 2 min	Hyd. volume	= 155,758 cuft
Inflow hyd. No.	= 1 - DA-3 - Landfill W	Max. Elevation	= 326.15 ft
Reservoir name	= Basin 3	Max. Storage	= 261,408 cuft

Storage Indication method used. Wet pond routing start elevation = 323.00 ft.

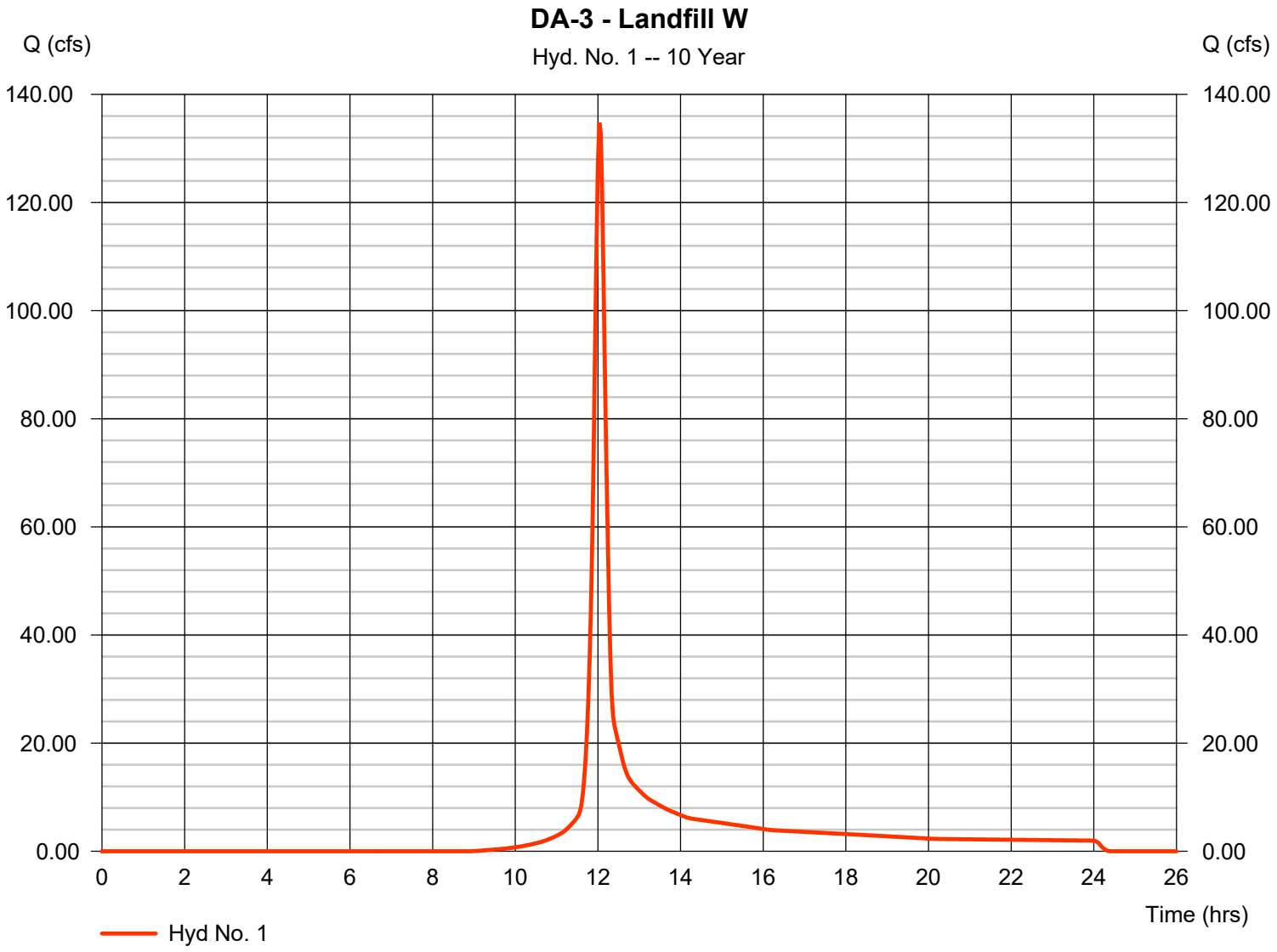


Hydrograph Report

Hyd. No. 1

DA-3 - Landfill W

Hydrograph type	=	SCS Runoff	Peak discharge	=	134.75 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	379,057 cuft
Drainage area	=	45.300 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



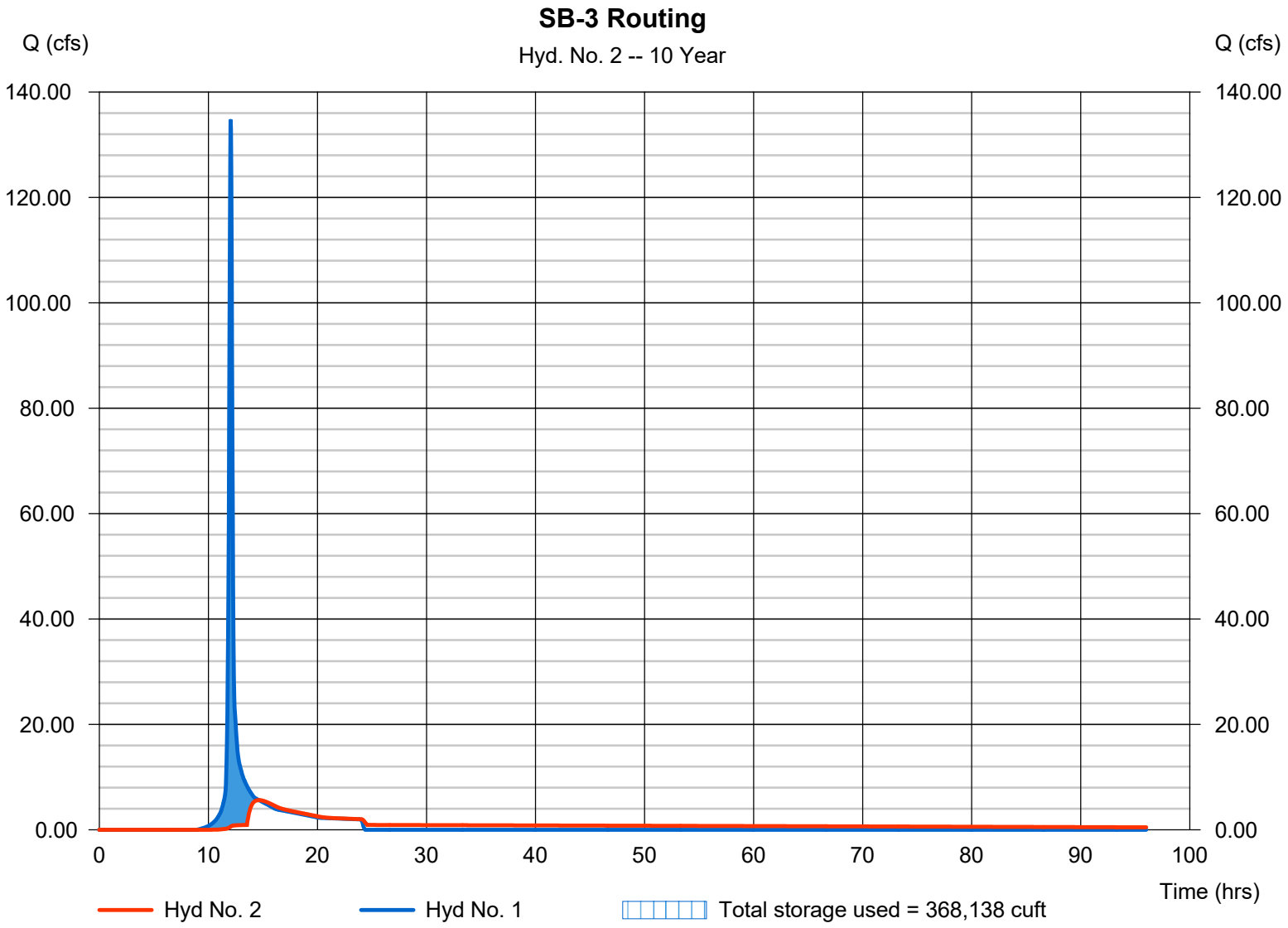
Hydrograph Report

Hyd. No. 2

SB-3 Routing

Hydrograph type	= Reservoir	Peak discharge	= 5.630 cfs
Storm frequency	= 10 yrs	Time to peak	= 14.63 hrs
Time interval	= 2 min	Hyd. volume	= 314,746 cuft
Inflow hyd. No.	= 1 - DA-3 - Landfill W	Max. Elevation	= 328.14 ft
Reservoir name	= Basin 3	Max. Storage	= 368,138 cuft

Storage Indication method used. Wet pond routing start elevation = 323.00 ft.



Hydrograph Report

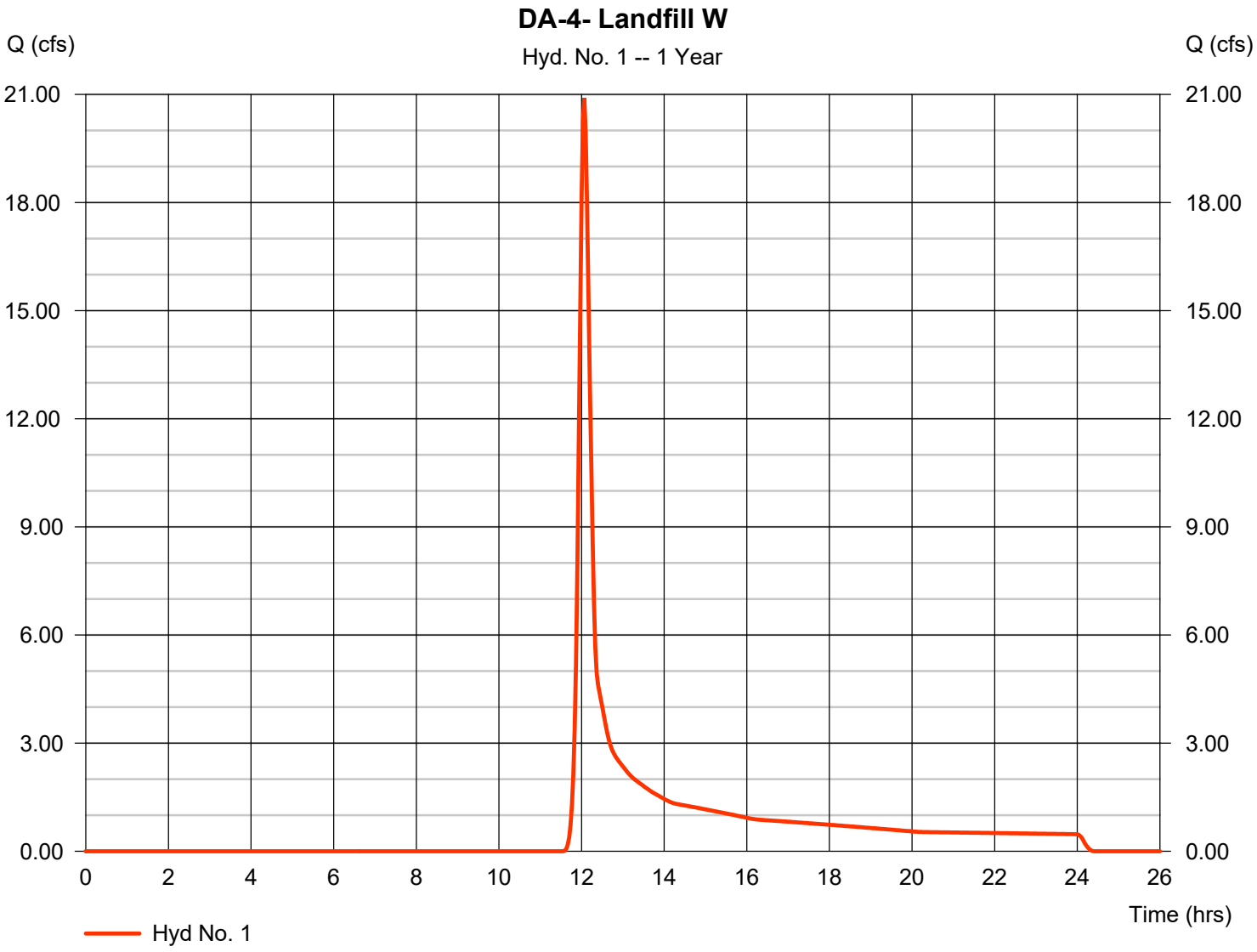
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-4- Landfill W

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.90 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	65,487 cuft
Drainage area	=	29.100 ac	Curve number	=	72*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	14.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(26.300 x 74) + (2.800 x 55)] / 29.100



Hydrograph Report

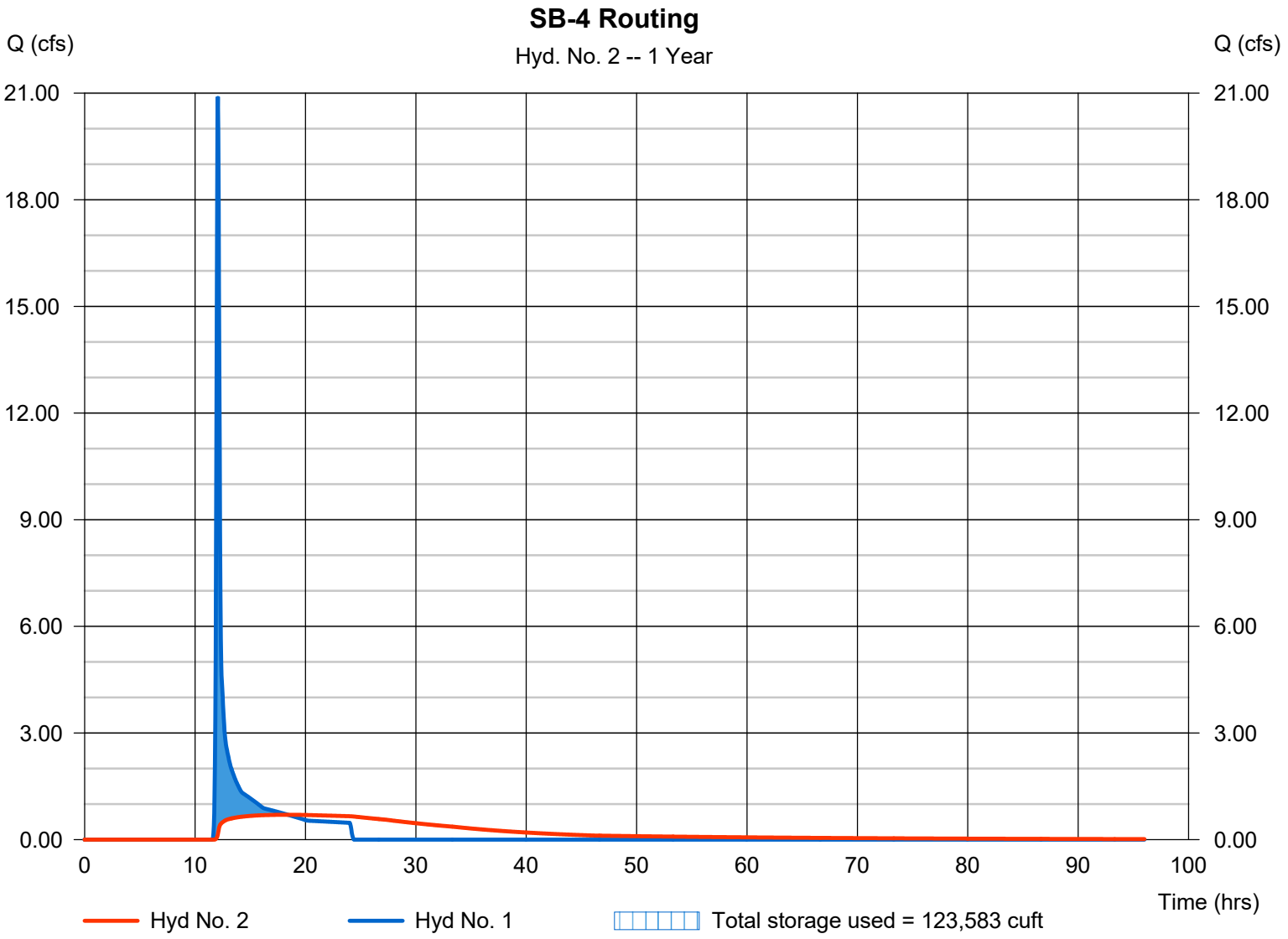
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 2

SB-4 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.699 cfs
Storm frequency	= 1 yrs	Time to peak	= 18.40 hrs
Time interval	= 2 min	Hyd. volume	= 64,210 cuft
Inflow hyd. No.	= 1 - DA-4- Landfill W	Max. Elevation	= 292.80 ft
Reservoir name	= Basin 4	Max. Storage	= 123,583 cuft

Storage Indication method used. Wet pond routing start elevation = 292.00 ft.



Pond Report

Pond No. 1 - Basin 4

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 290.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	290.00	38,058	0	0
2.00	292.00	45,844	83,902	83,902
4.00	294.00	53,631	99,475	183,377
6.00	296.00	61,418	115,049	298,426
8.00	298.00	70,704	132,122	430,548
10.00	300.00	79,991	150,695	581,243
12.00	302.00	89,277	169,268	750,511

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 42.00	6.00	0.00	0.00
Span (in)	= 42.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 290.00	292.00	0.00	0.00
Length (ft)	= 145.00	1.00	0.00	0.00
Slope (%)	= 13.80	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

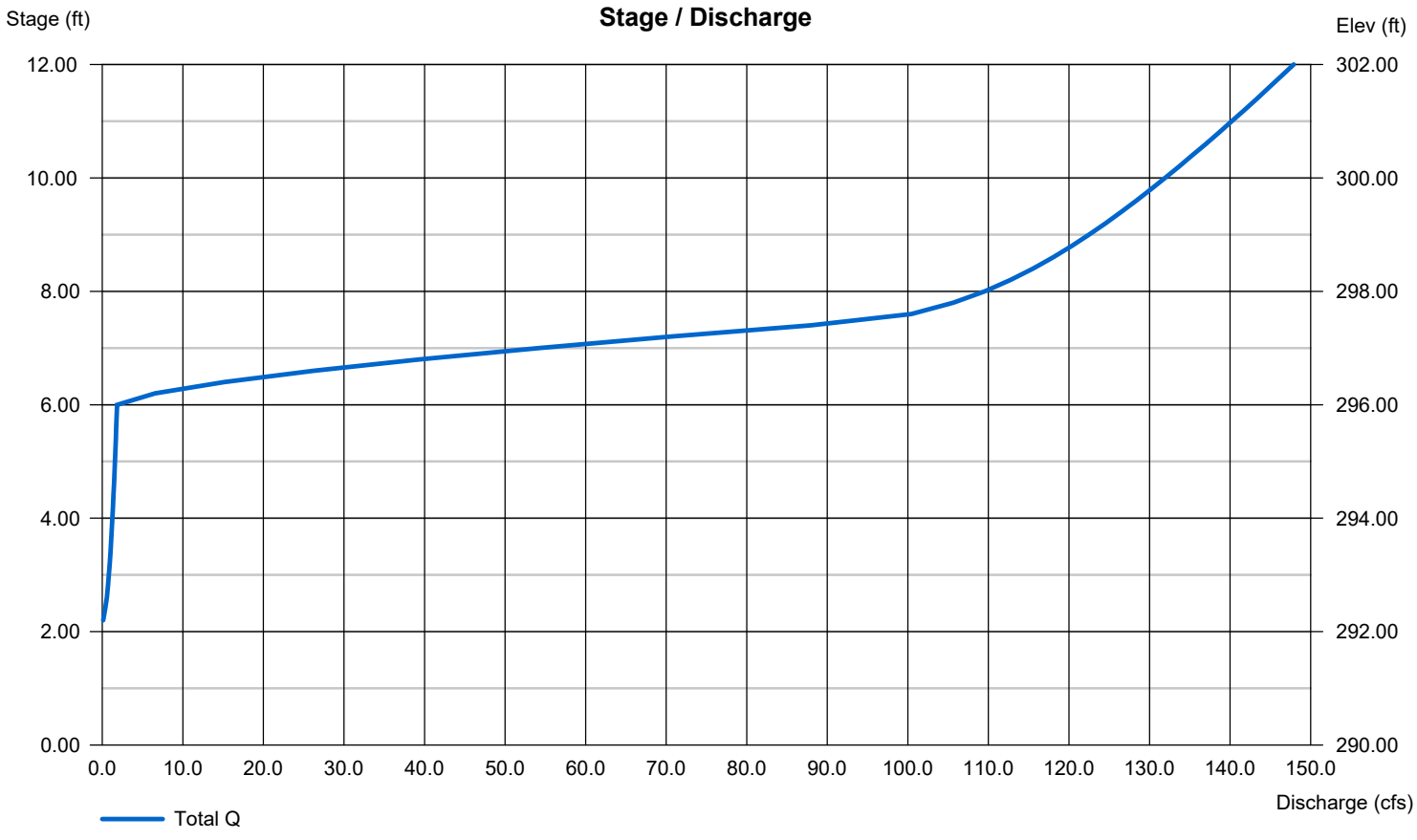
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	Inactive	0.00	0.00
Crest El. (ft)	= 296.00	298.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



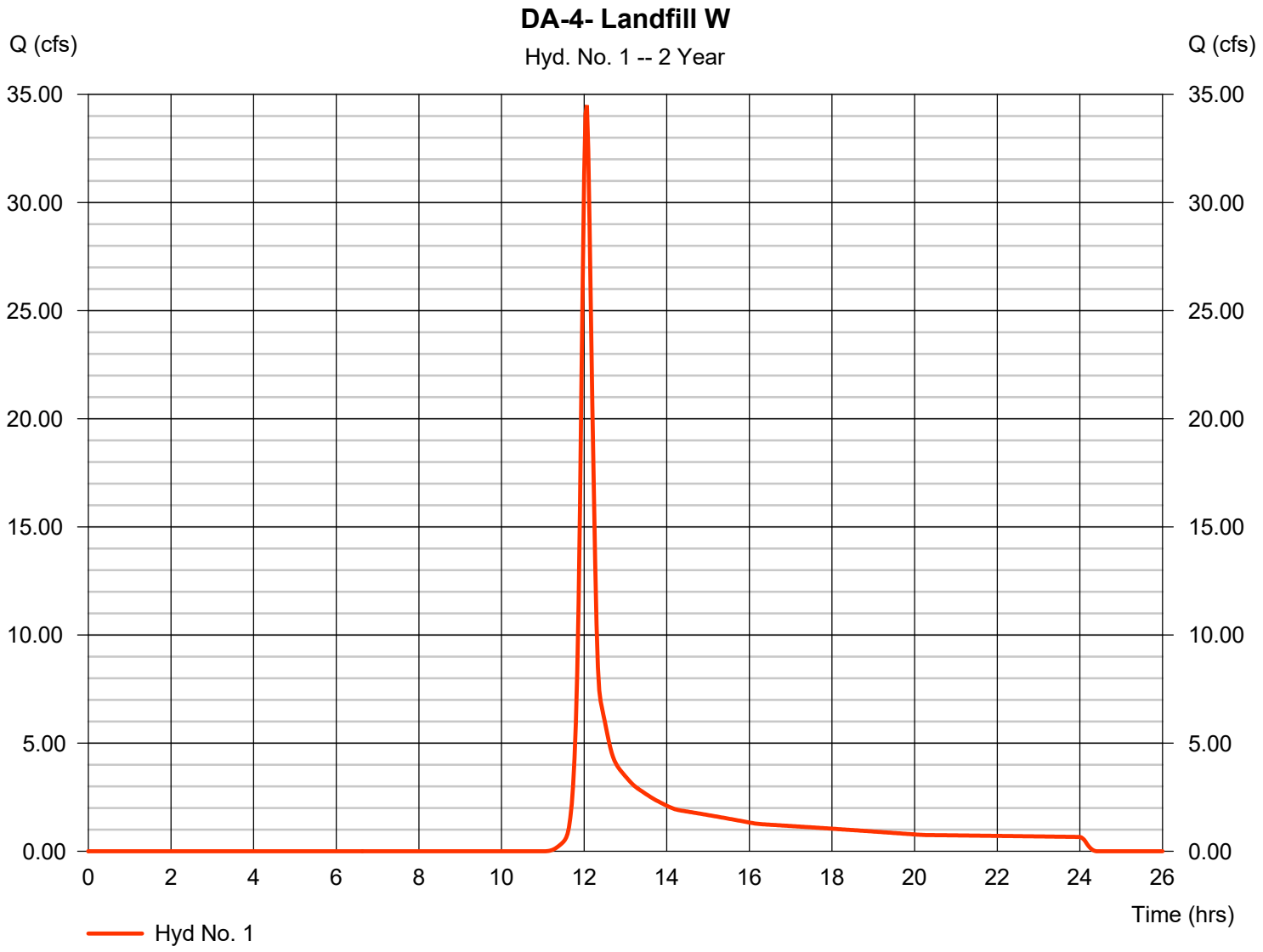
Hydrograph Report

Hyd. No. 1

DA-4- Landfill W

Hydrograph type	=	SCS Runoff	Peak discharge	=	34.50 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	102,197 cuft
Drainage area	=	29.100 ac	Curve number	=	72*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	14.00 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(26.300 x 74) + (2.800 x 55)] / 29.100



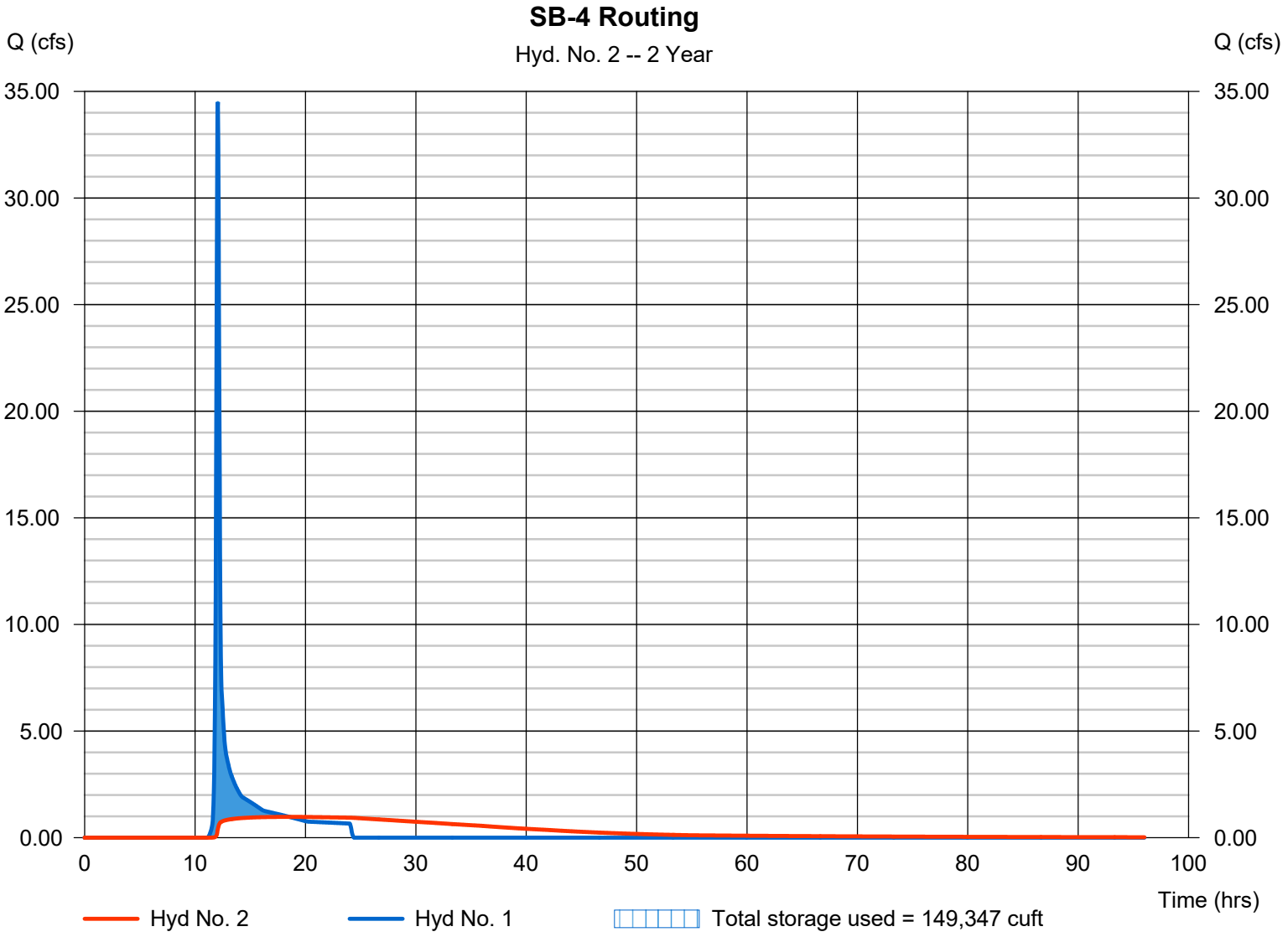
Hydrograph Report

Hyd. No. 2

SB-4 Routing

Hydrograph type	=	Reservoir	Peak discharge	=	0.975 cfs
Storm frequency	=	2 yrs	Time to peak	=	18.53 hrs
Time interval	=	2 min	Hyd. volume	=	100,380 cuft
Inflow hyd. No.	=	1 - DA-4- Landfill W	Max. Elevation	=	293.32 ft
Reservoir name	=	Basin 4	Max. Storage	=	149,347 cuft

Storage Indication method used. Wet pond routing start elevation = 292.00 ft.



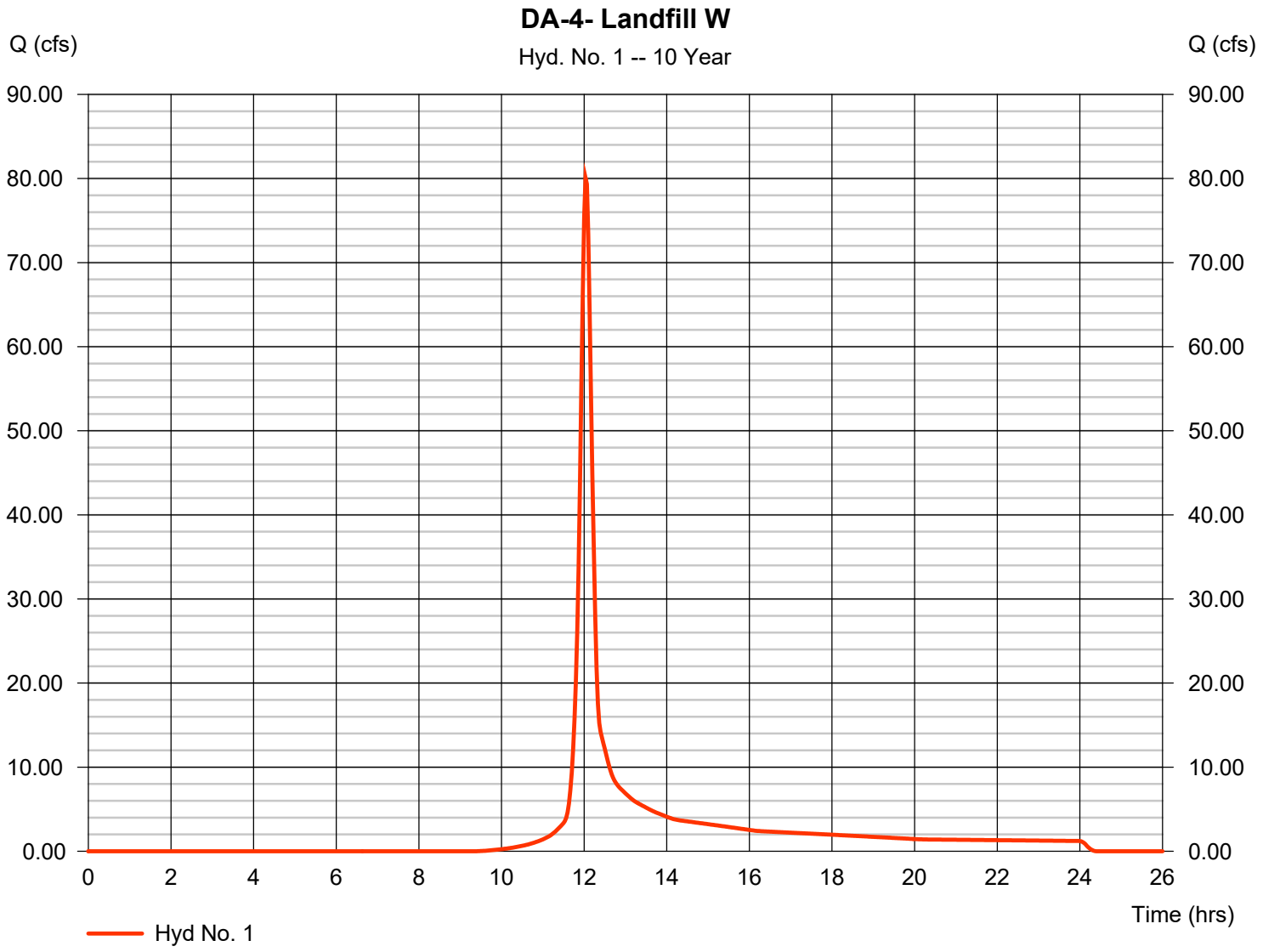
Hydrograph Report

Hyd. No. 1

DA-4- Landfill W

Hydrograph type	=	SCS Runoff	Peak discharge	=	80.08 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	226,363 cuft
Drainage area	=	29.100 ac	Curve number	=	72*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	14.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(26.300 x 74) + (2.800 x 55)] / 29.100



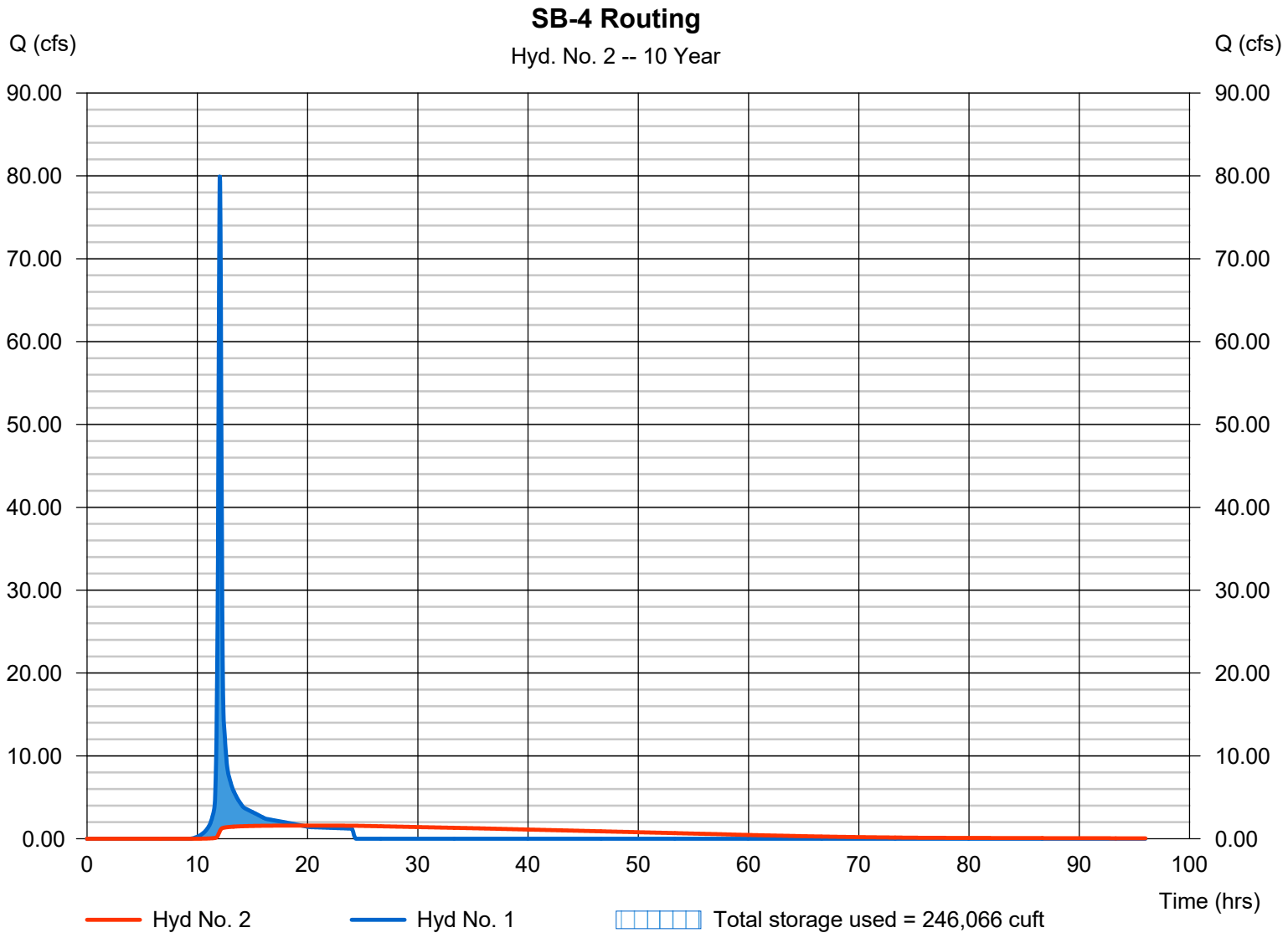
Hydrograph Report

Hyd. No. 2

SB-4 Routing

Hydrograph type	=	Reservoir	Peak discharge	=	1.593 cfs
Storm frequency	=	10 yrs	Time to peak	=	19.47 hrs
Time interval	=	2 min	Hyd. volume	=	221,998 cuft
Inflow hyd. No.	=	1 - DA-4- Landfill W	Max. Elevation	=	295.09 ft
Reservoir name	=	Basin 4	Max. Storage	=	246,066 cuft

Storage Indication method used. Wet pond routing start elevation = 292.00 ft.



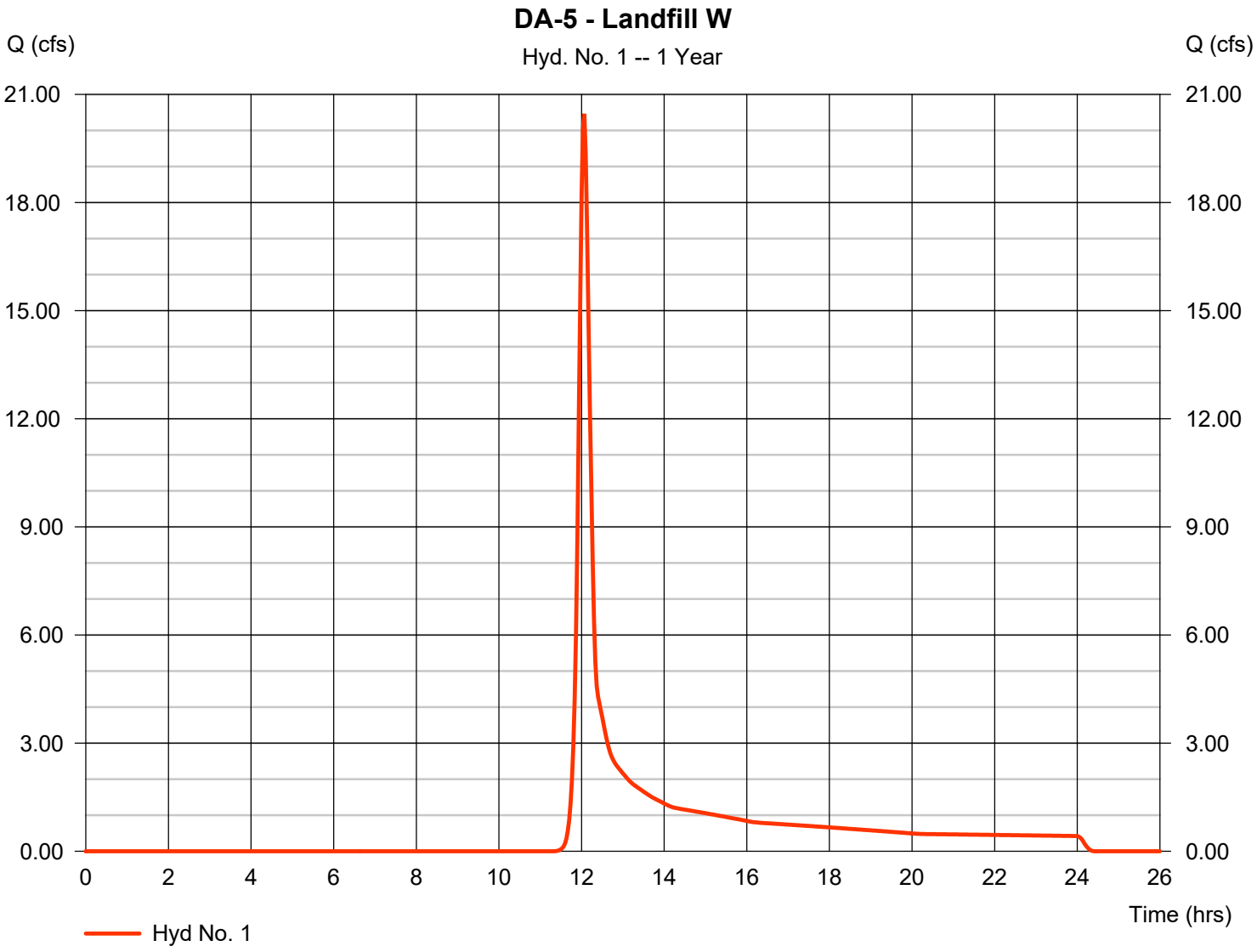
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-5 - Landfill W

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.46 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	62,001 cuft
Drainage area	=	24.200 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	14.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

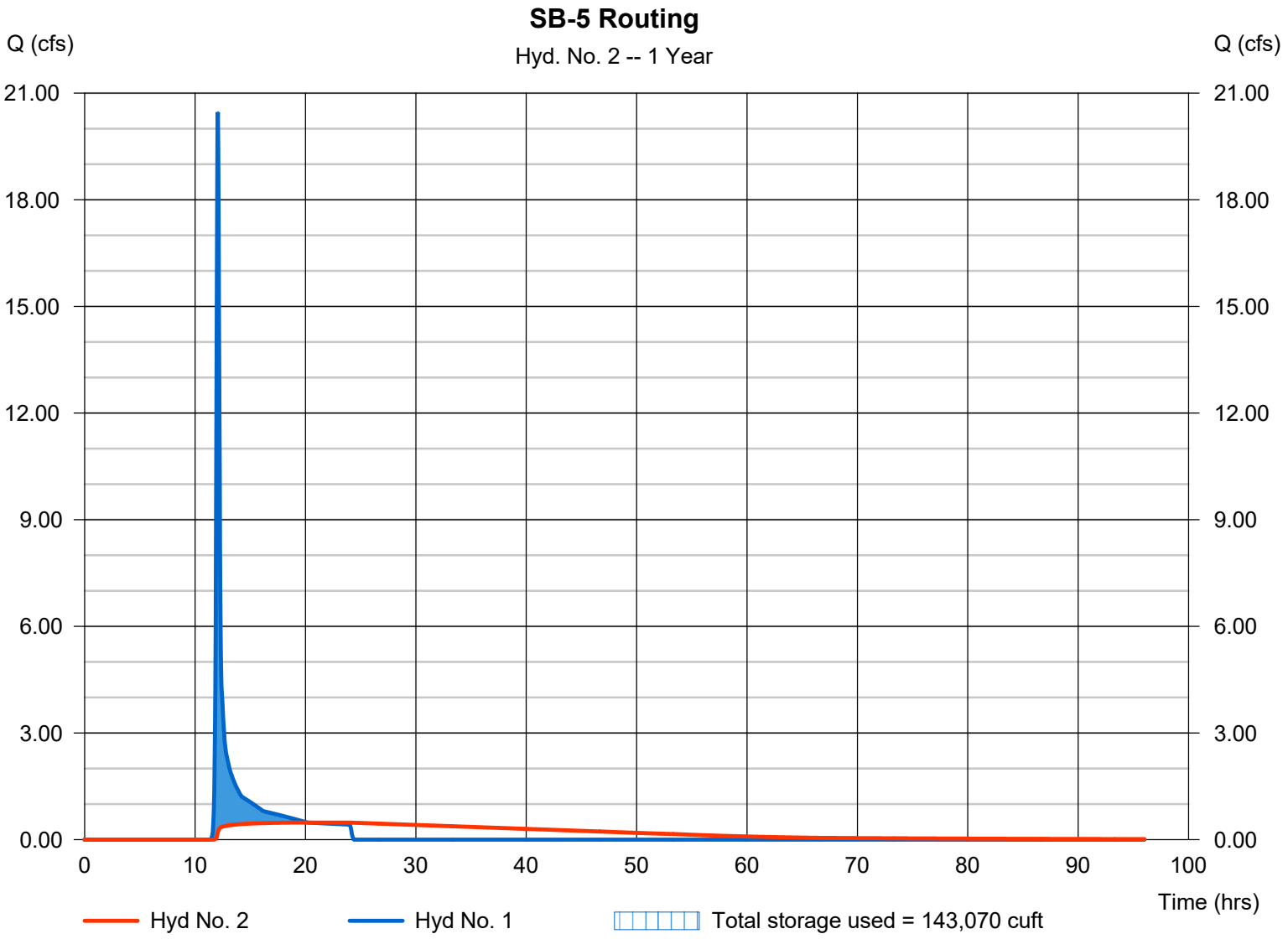
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 2

SB-5 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.480 cfs
Storm frequency	= 1 yrs	Time to peak	= 20.20 hrs
Time interval	= 2 min	Hyd. volume	= 60,768 cuft
Inflow hyd. No.	= 1 - DA-5 - Landfill W	Max. Elevation	= 289.97 ft
Reservoir name	= Basin 5	Max. Storage	= 143,070 cuft

Storage Indication method used. Wet pond routing start elevation = 288.50 ft.



Pond Report

Pond No. 1 - Basin 5

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 284.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	284.00	17,618	0	0
2.00	286.00	21,851	39,469	39,469
3.00	287.00	23,967	22,909	62,378
4.00	288.00	26,084	25,026	87,404
4.50	288.50	27,142	13,307	100,710
6.00	290.00	30,317	43,094	143,804
7.00	291.00	32,433	31,375	175,179
8.00	292.00	34,550	33,492	208,671
10.00	294.00	38,783	73,333	282,004
12.00	296.00	43,016	81,799	363,803

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	4.00	0.00	0.00
Span (in)	= 36.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 284.00	288.50	0.00	0.00
Length (ft)	= 140.00	1.00	0.00	0.00
Slope (%)	= 7.14	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

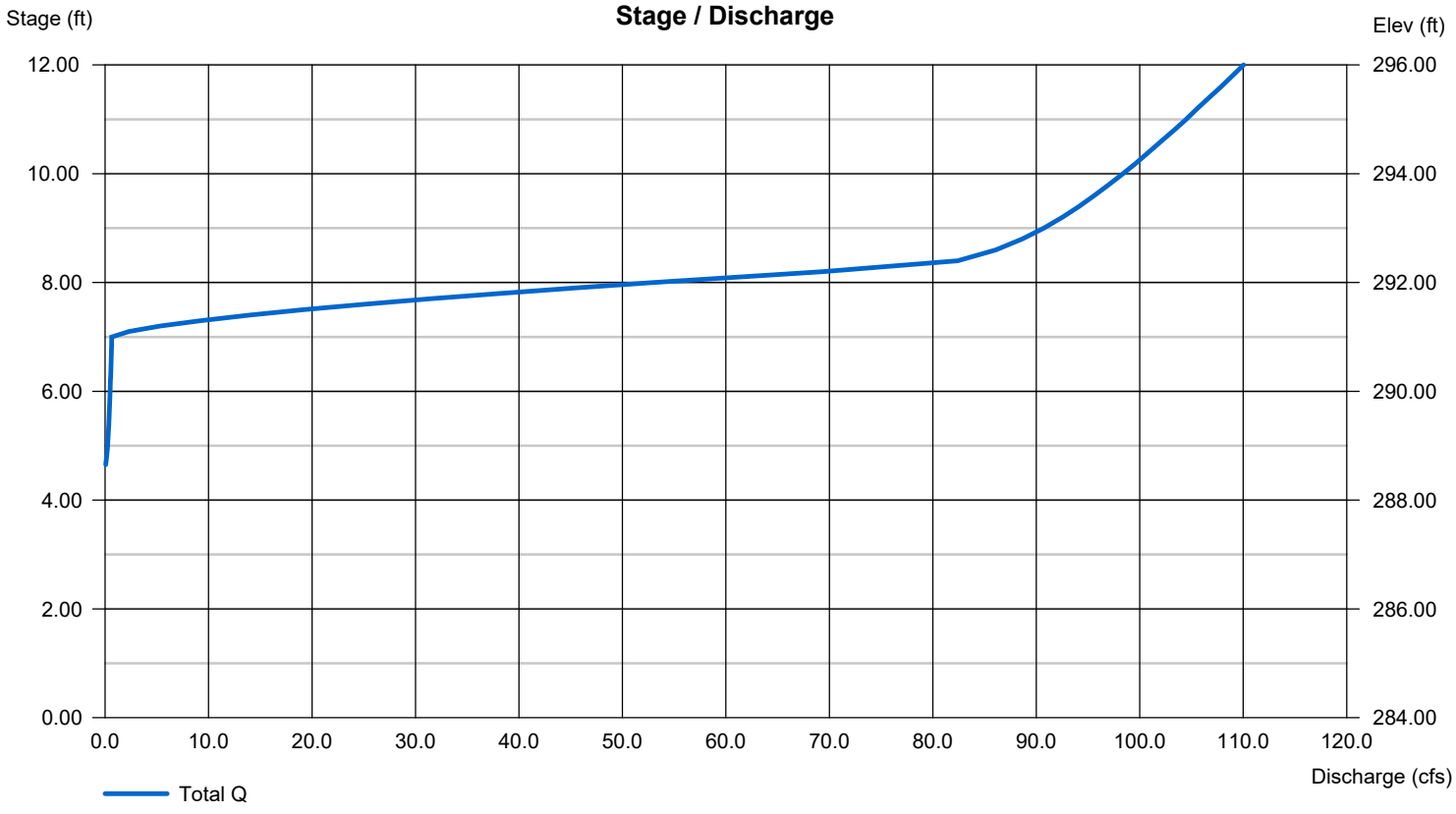
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	Inactive	0.00	0.00
Crest El. (ft)	= 291.00	298.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

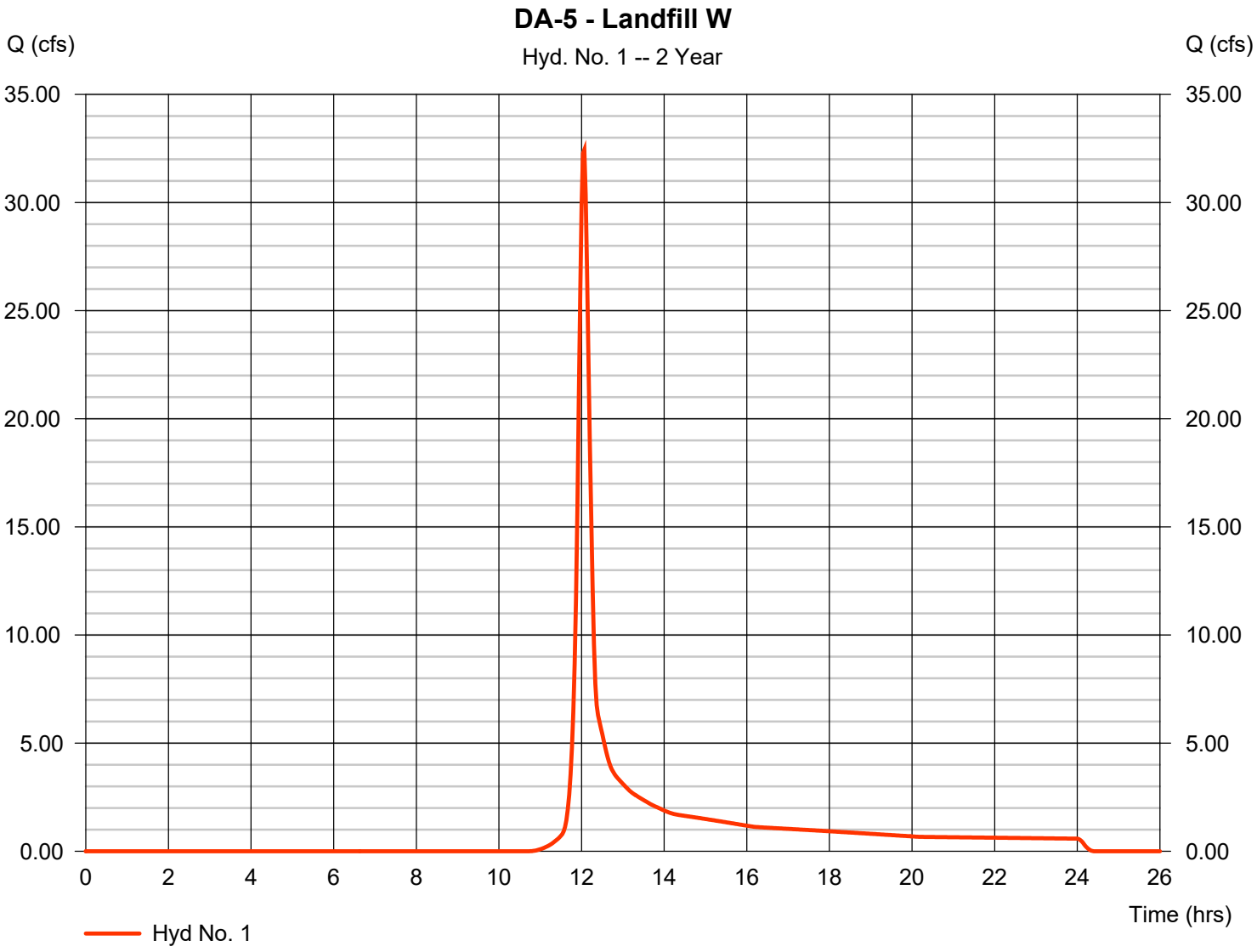


Hydrograph Report

Hyd. No. 1

DA-5 - Landfill W

Hydrograph type	=	SCS Runoff	Peak discharge	=	32.43 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	94,552 cuft
Drainage area	=	24.200 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	14.00 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



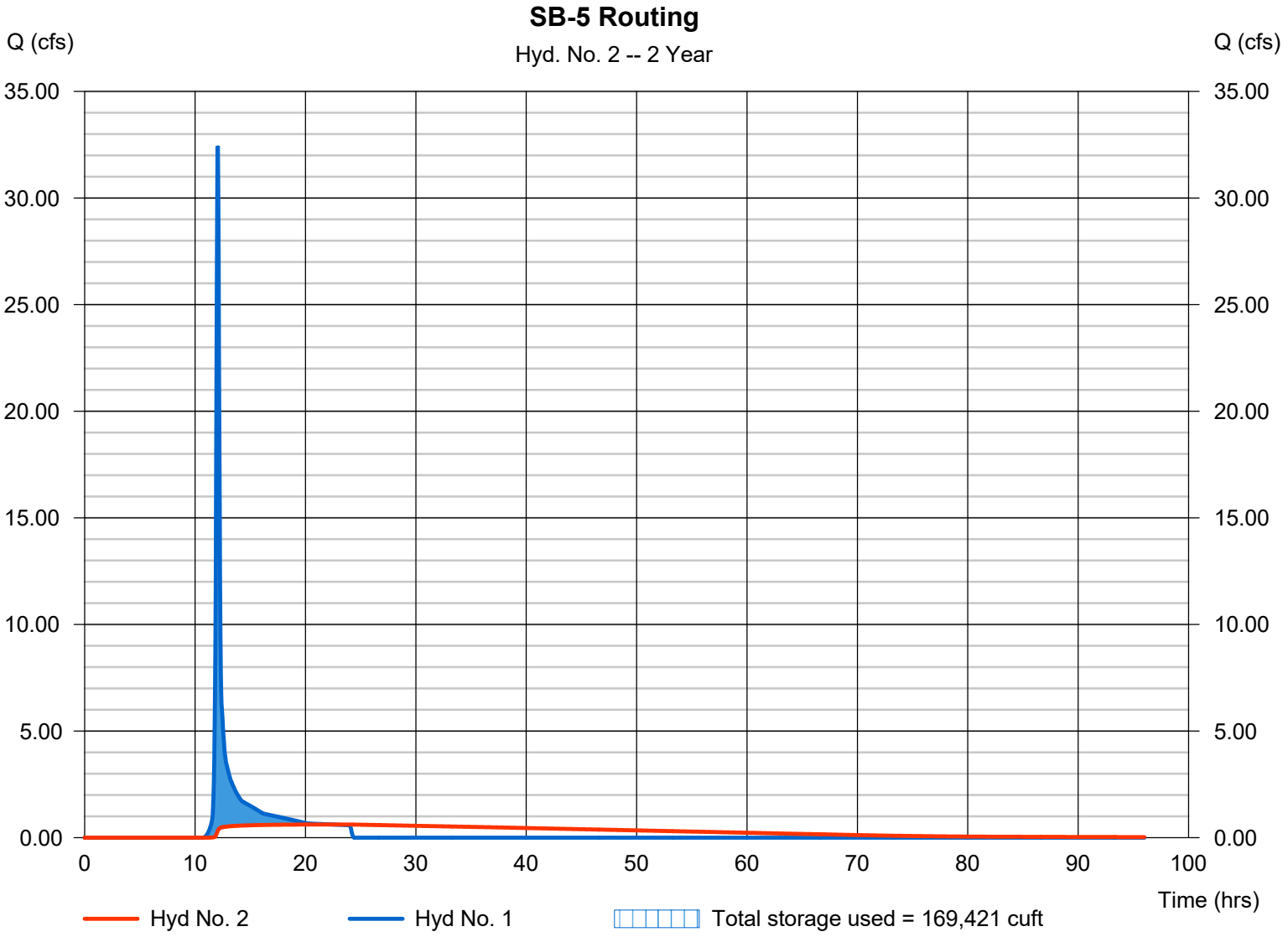
Hydrograph Report

Hyd. No. 2

SB-5 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.616 cfs
Storm frequency	= 2 yrs	Time to peak	= 22.50 hrs
Time interval	= 2 min	Hyd. volume	= 92,366 cuft
Inflow hyd. No.	= 1 - DA-5 - Landfill W	Max. Elevation	= 290.82 ft
Reservoir name	= Basin 5	Max. Storage	= 169,421 cuft

Storage Indication method used. Wet pond routing start elevation = 288.50 ft.

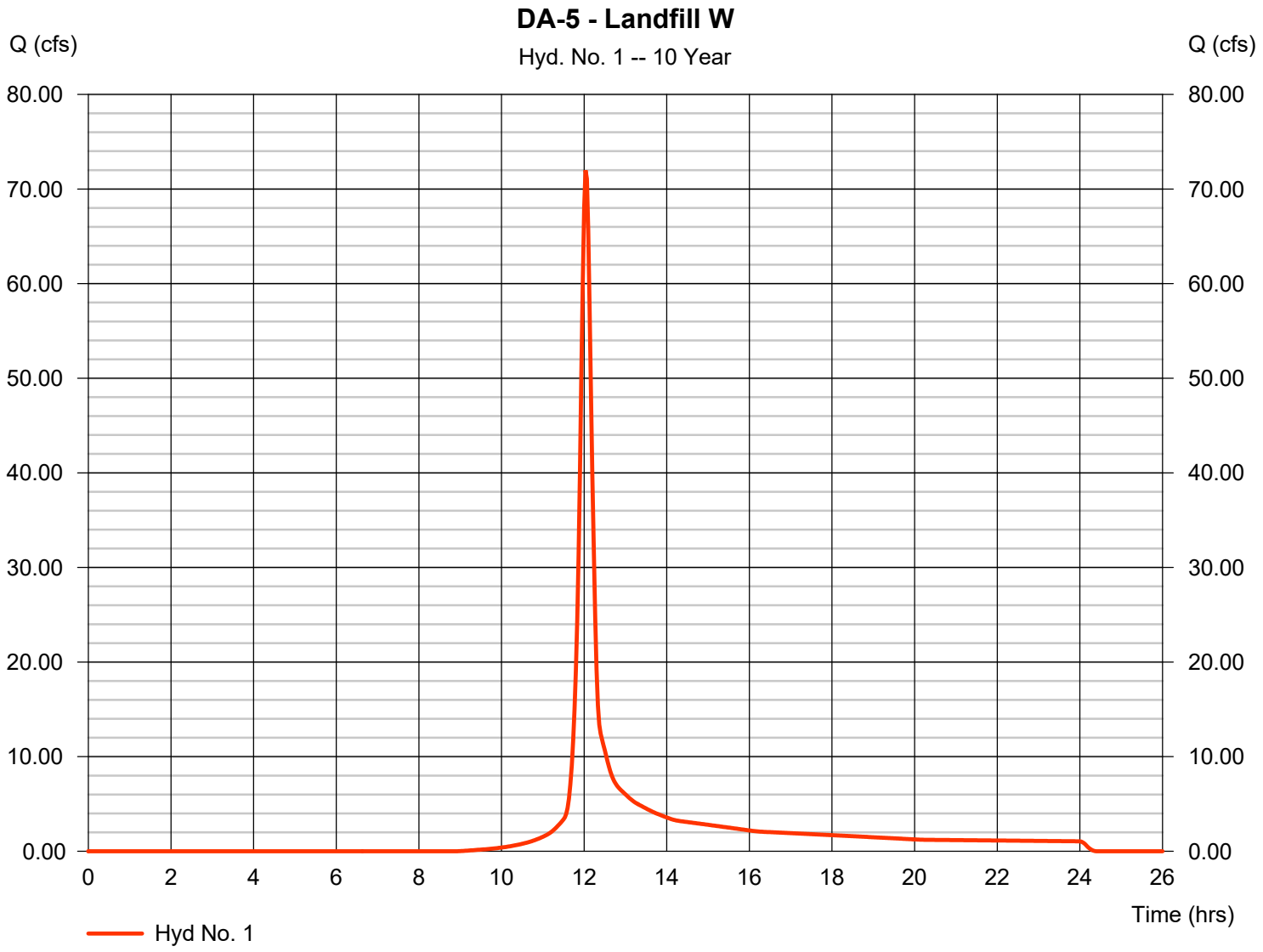


Hydrograph Report

Hyd. No. 1

DA-5 - Landfill W

Hydrograph type	=	SCS Runoff	Peak discharge	=	71.98 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	202,498 cuft
Drainage area	=	24.200 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	14.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



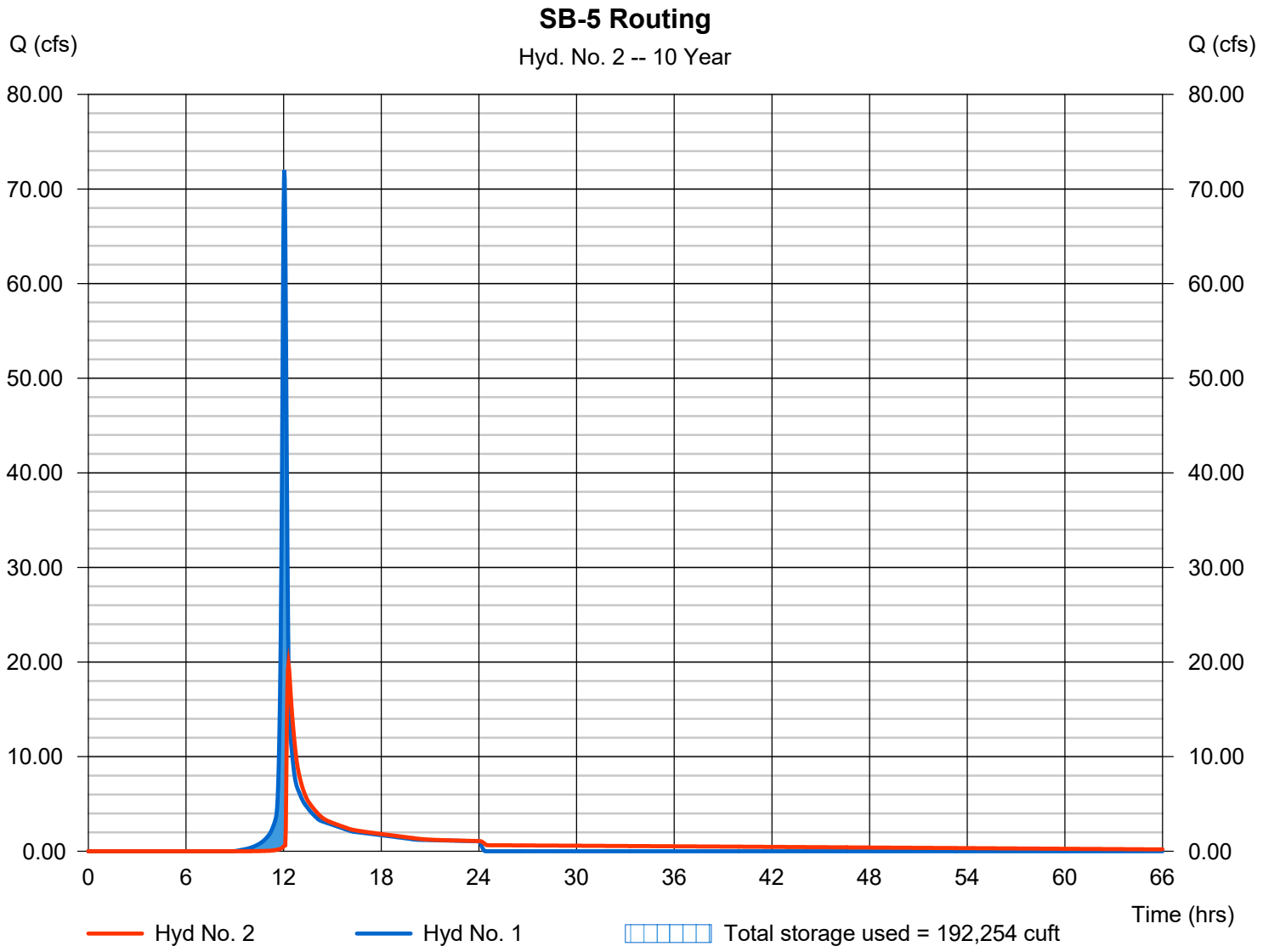
Hydrograph Report

Hyd. No. 2

SB-5 Routing

Hydrograph type	=	Reservoir	Peak discharge	=	19.77 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.30 hrs
Time interval	=	2 min	Hyd. volume	=	200,029 cuft
Inflow hyd. No.	=	1 - DA-5 - Landfill W	Max. Elevation	=	291.51 ft
Reservoir name	=	Basin 5	Max. Storage	=	192,254 cuft

Storage Indication method used. Wet pond routing start elevation = 288.50 ft.



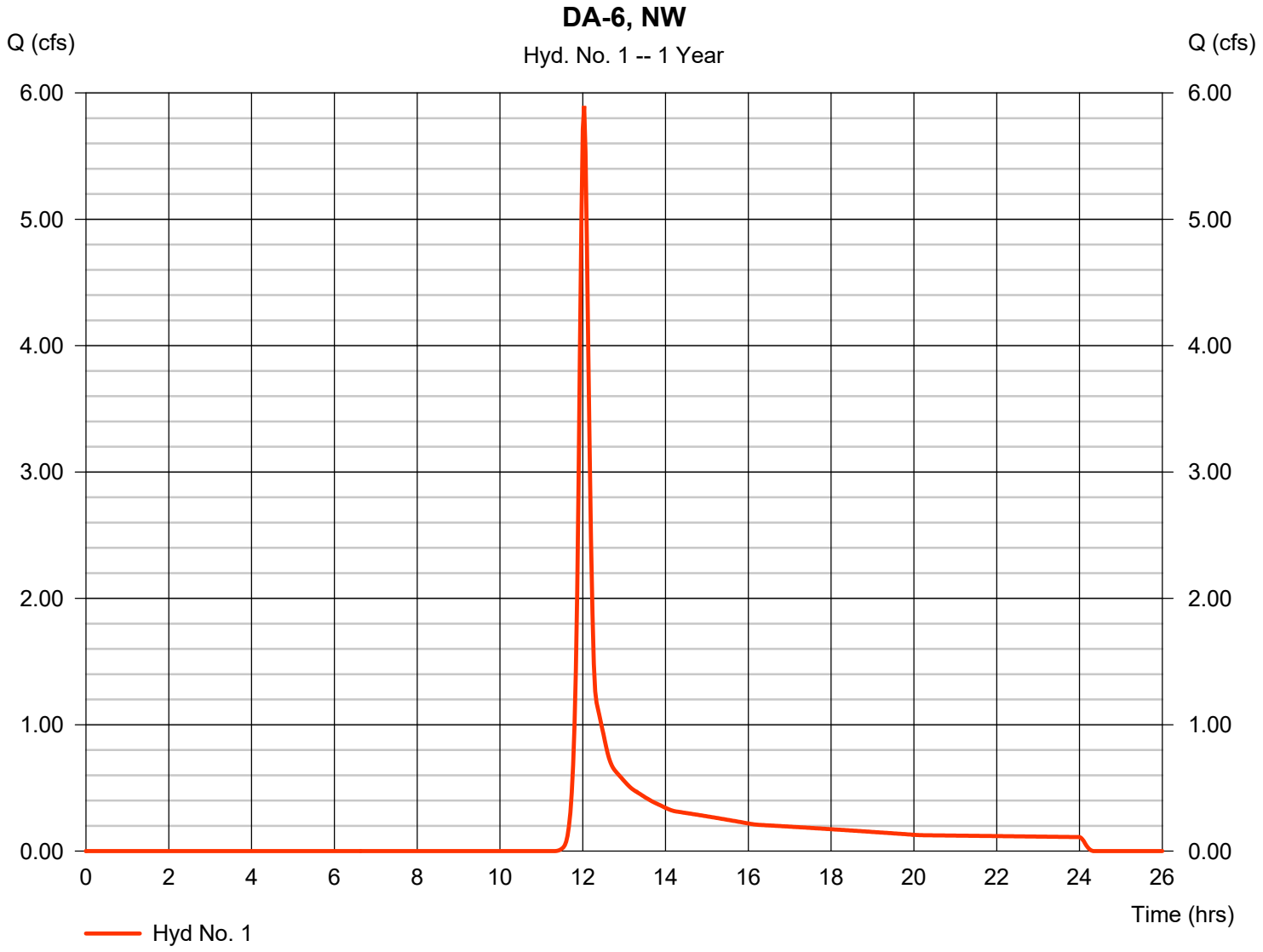
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-6, NW

Hydrograph type	= SCS Runoff	Peak discharge	= 5.895 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 16,259 cuft
Drainage area	= 6.000 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.50 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

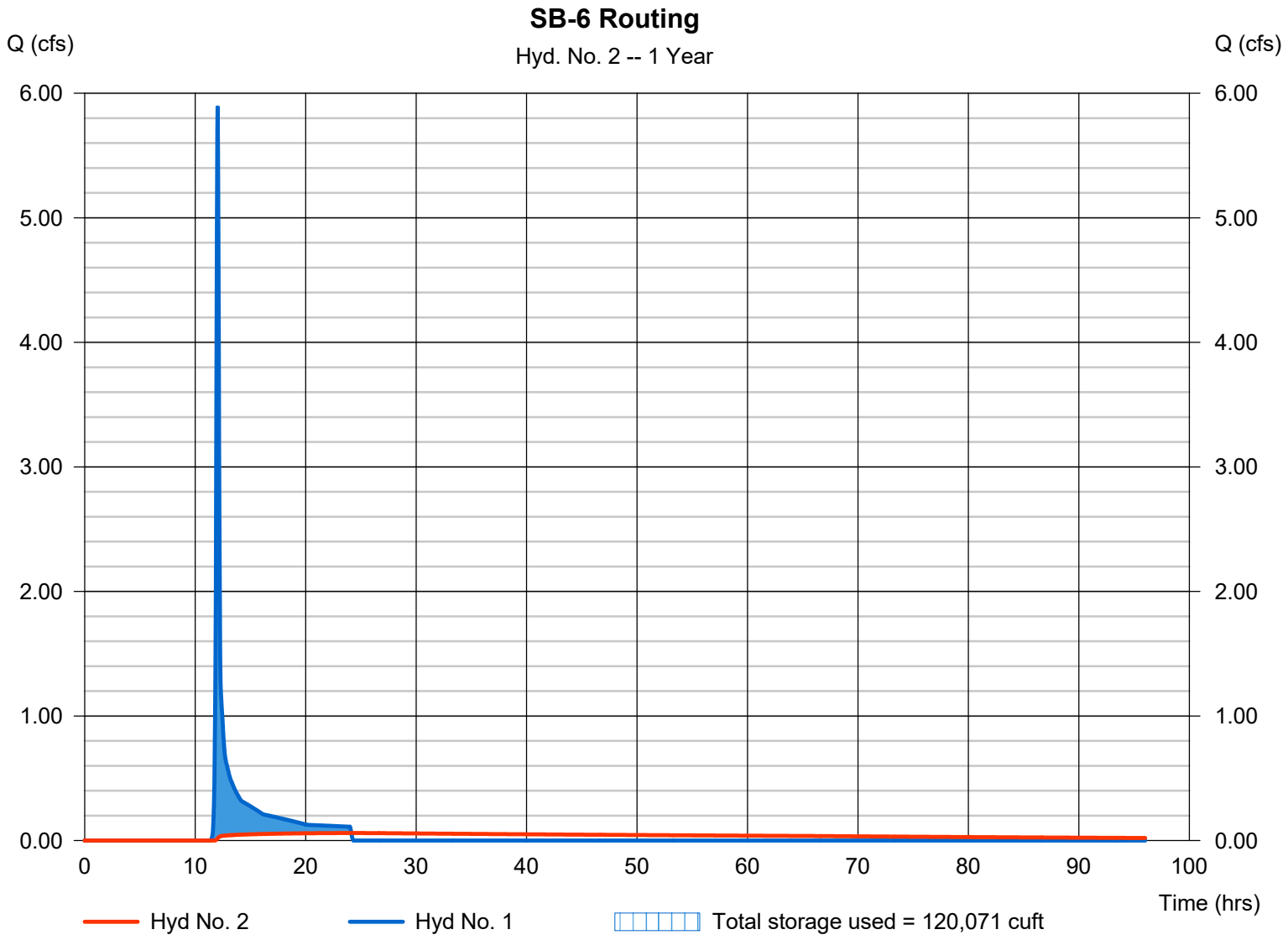
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 2

SB-6 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.061 cfs
Storm frequency	= 1 yrs	Time to peak	= 24.13 hrs
Time interval	= 2 min	Hyd. volume	= 12,479 cuft
Inflow hyd. No.	= 1 - DA-6, NW	Max. Elevation	= 304.42 ft
Reservoir name	= Basin 6	Max. Storage	= 120,071 cuft

Storage Indication method used. Wet pond routing start elevation = 304.00 ft.



Pond Report

Pond No. 1 - Basin 6

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 300.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	300.00	21,998	0	0
2.00	302.00	26,540	48,538	48,538
3.00	303.00	28,811	27,676	76,214
4.00	304.00	31,083	29,947	106,161
6.00	306.00	35,626	66,709	172,870
8.00	308.00	40,168	75,794	248,664
10.00	310.00	44,710	84,878	333,542
12.00	312.00	49,253	93,963	427,505

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	0.00	0.00
Span (in)	= 24.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 300.00	304.00	0.00	0.00
Length (ft)	= 310.00	1.00	0.00	0.00
Slope (%)	= 5.80	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

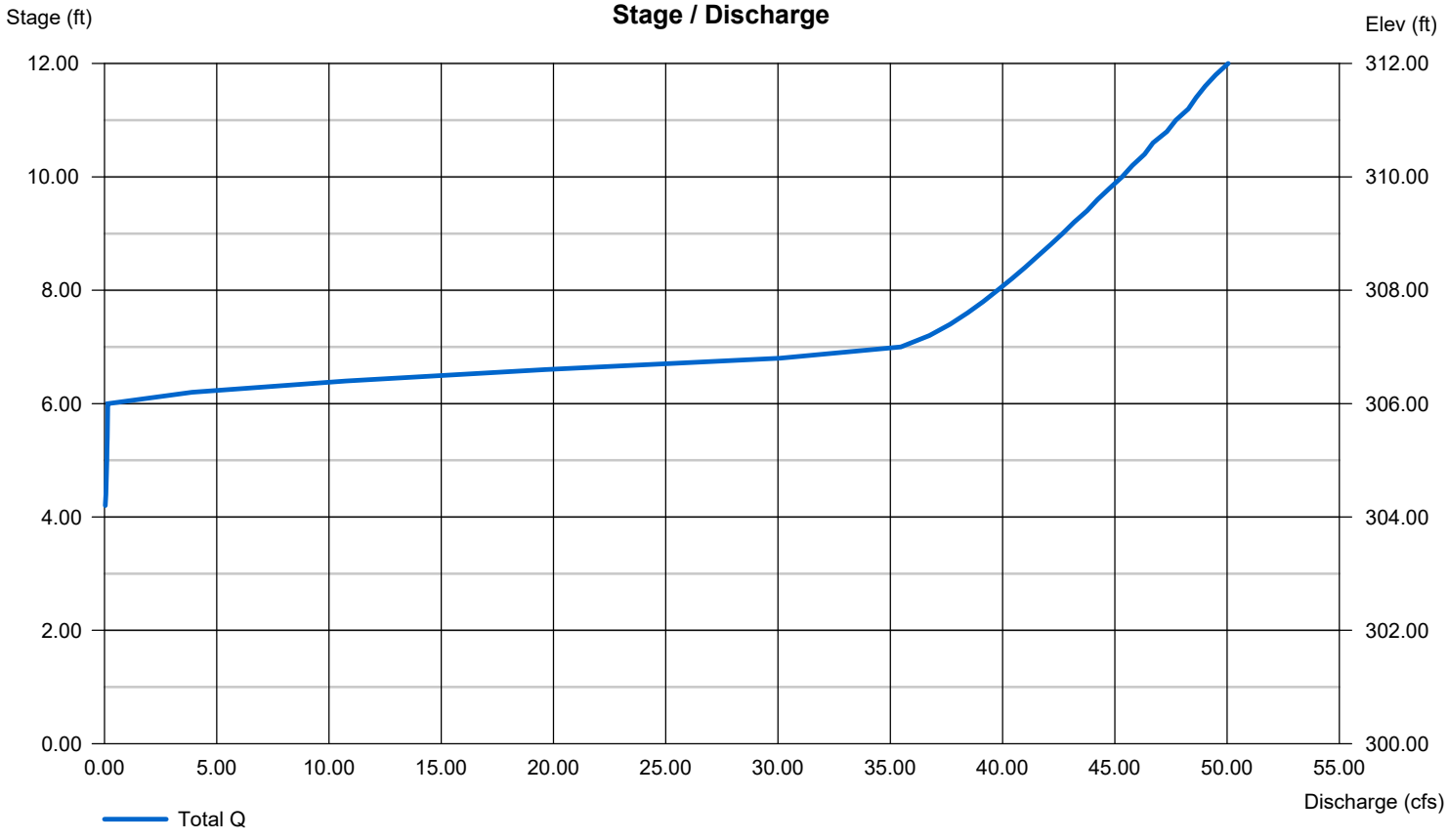
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.57	Inactive	0.00	0.00
Crest El. (ft)	= 306.00	298.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

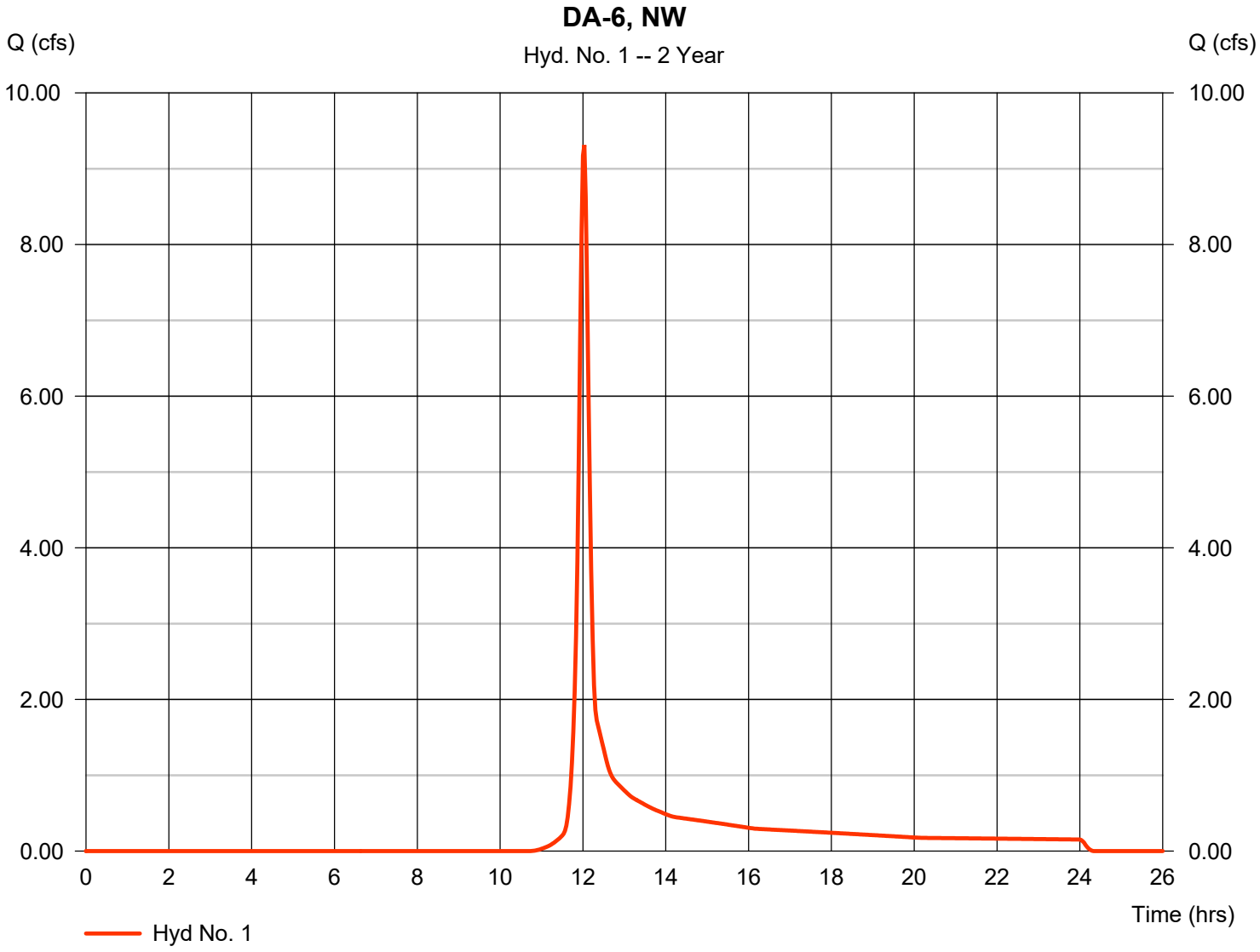


Hydrograph Report

Hyd. No. 1

DA-6, NW

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.311 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	24,795 cuft
Drainage area	=	6.000 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.50 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



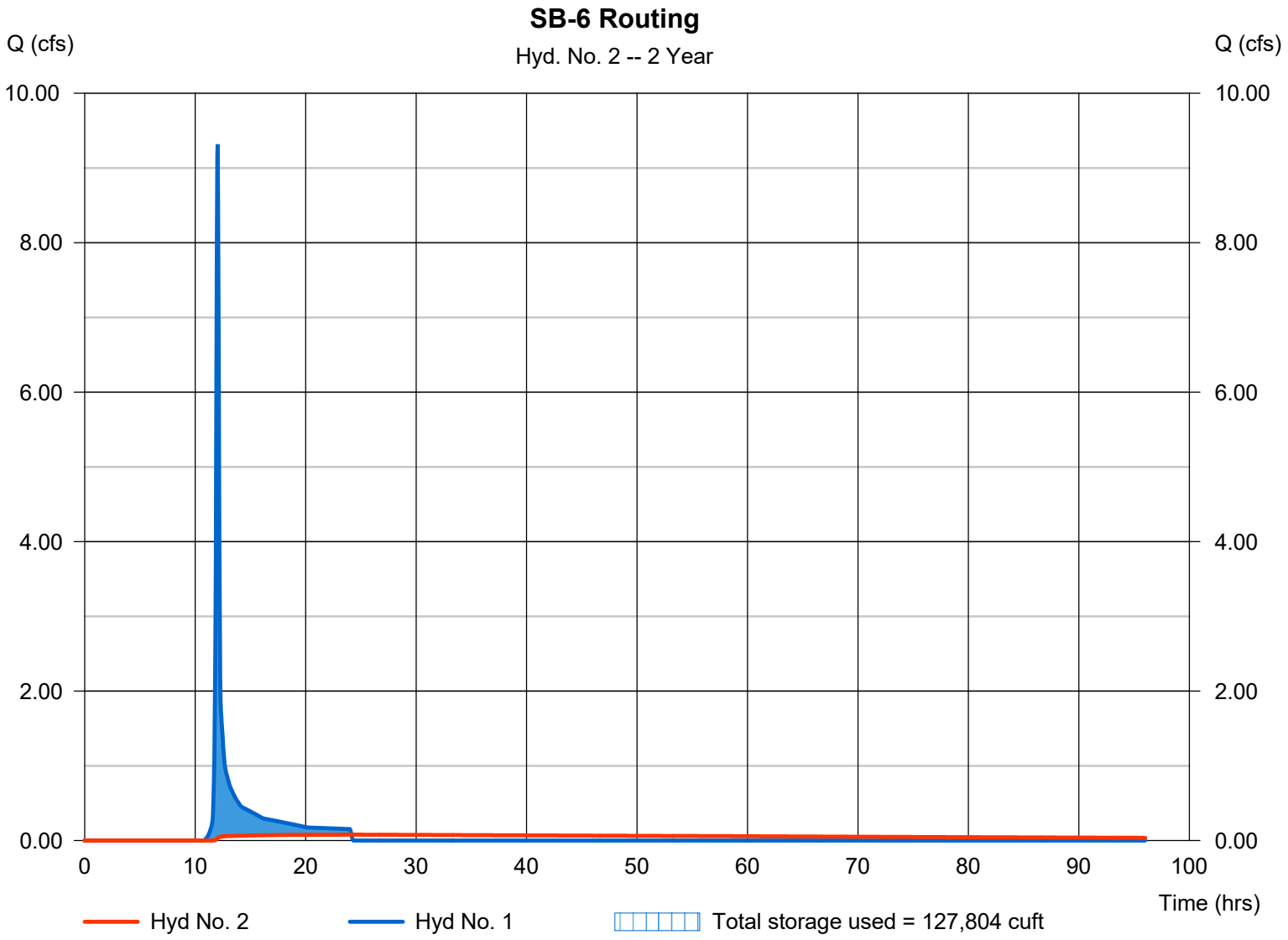
Hydrograph Report

Hyd. No. 2

SB-6 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.079 cfs
Storm frequency	= 2 yrs	Time to peak	= 24.13 hrs
Time interval	= 2 min	Hyd. volume	= 17,921 cuft
Inflow hyd. No.	= 1 - DA-6, NW	Max. Elevation	= 304.65 ft
Reservoir name	= Basin 6	Max. Storage	= 127,804 cuft

Storage Indication method used. Wet pond routing start elevation = 304.00 ft.

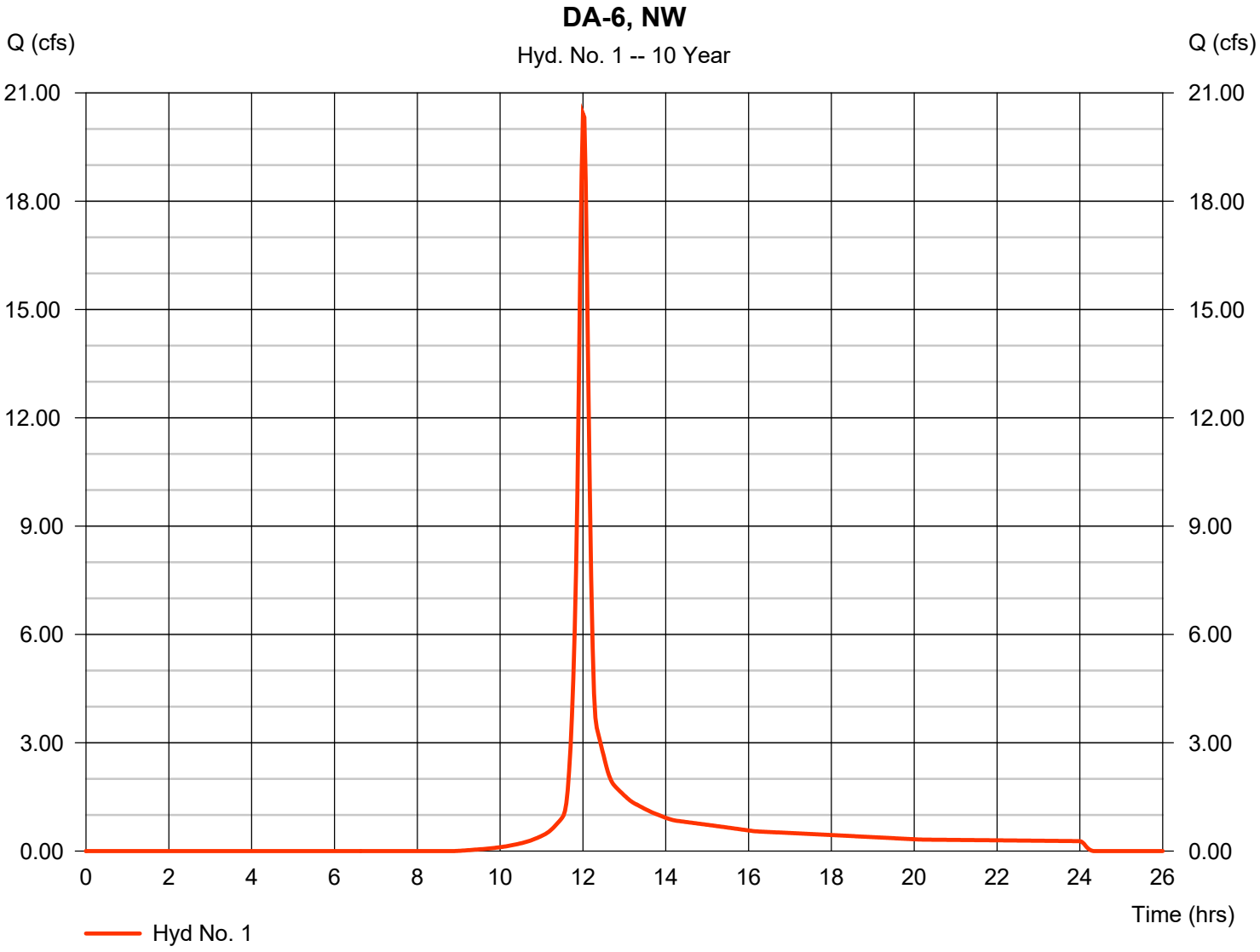


Hydrograph Report

Hyd. No. 1

DA-6, NW

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.42 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	53,103 cuft
Drainage area	=	6.000 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



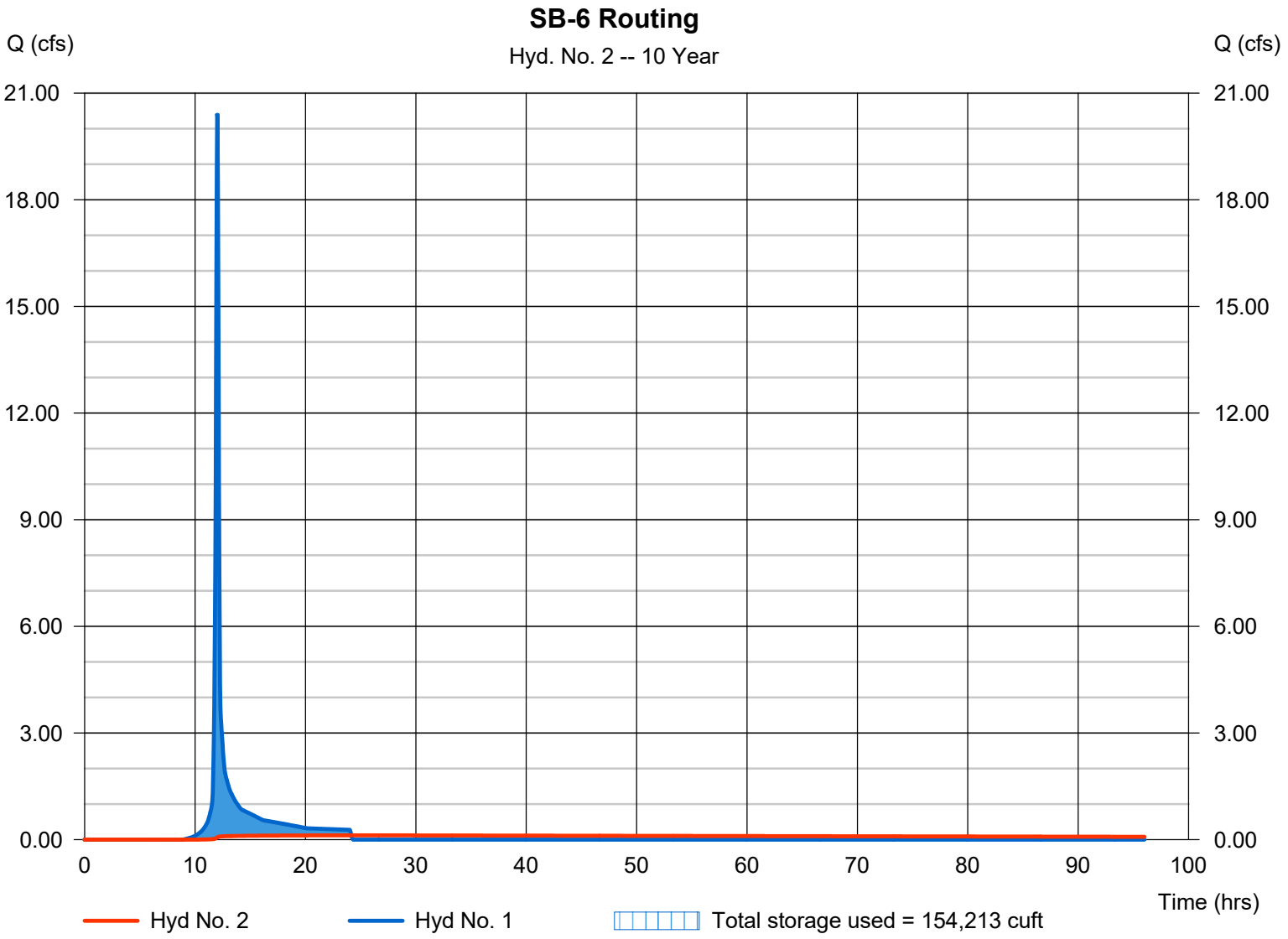
Hydrograph Report

Hyd. No. 2

SB-6 Routing

Hydrograph type	=	Reservoir	Peak discharge	=	0.122 cfs
Storm frequency	=	10 yrs	Time to peak	=	24.17 hrs
Time interval	=	2 min	Hyd. volume	=	31,130 cuft
Inflow hyd. No.	=	1 - DA-6, NW	Max. Elevation	=	305.44 ft
Reservoir name	=	Basin 6	Max. Storage	=	154,213 cuft

Storage Indication method used. Wet pond routing start elevation = 304.00 ft.



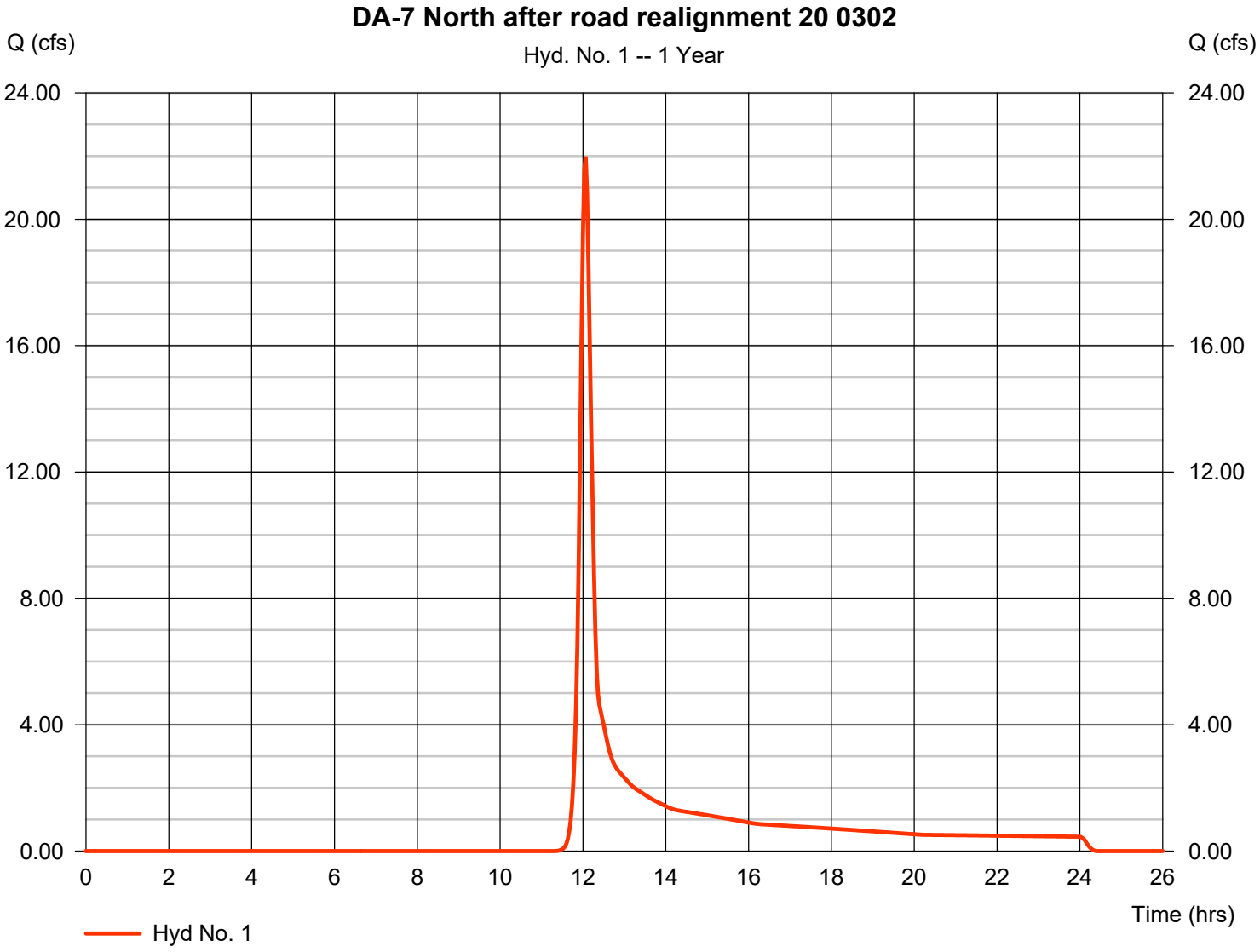
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-7 North after road realignment 20 0302

Hydrograph type	= SCS Runoff	Peak discharge	= 21.99 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 66,612 cuft
Drainage area	= 26.000 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.50 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



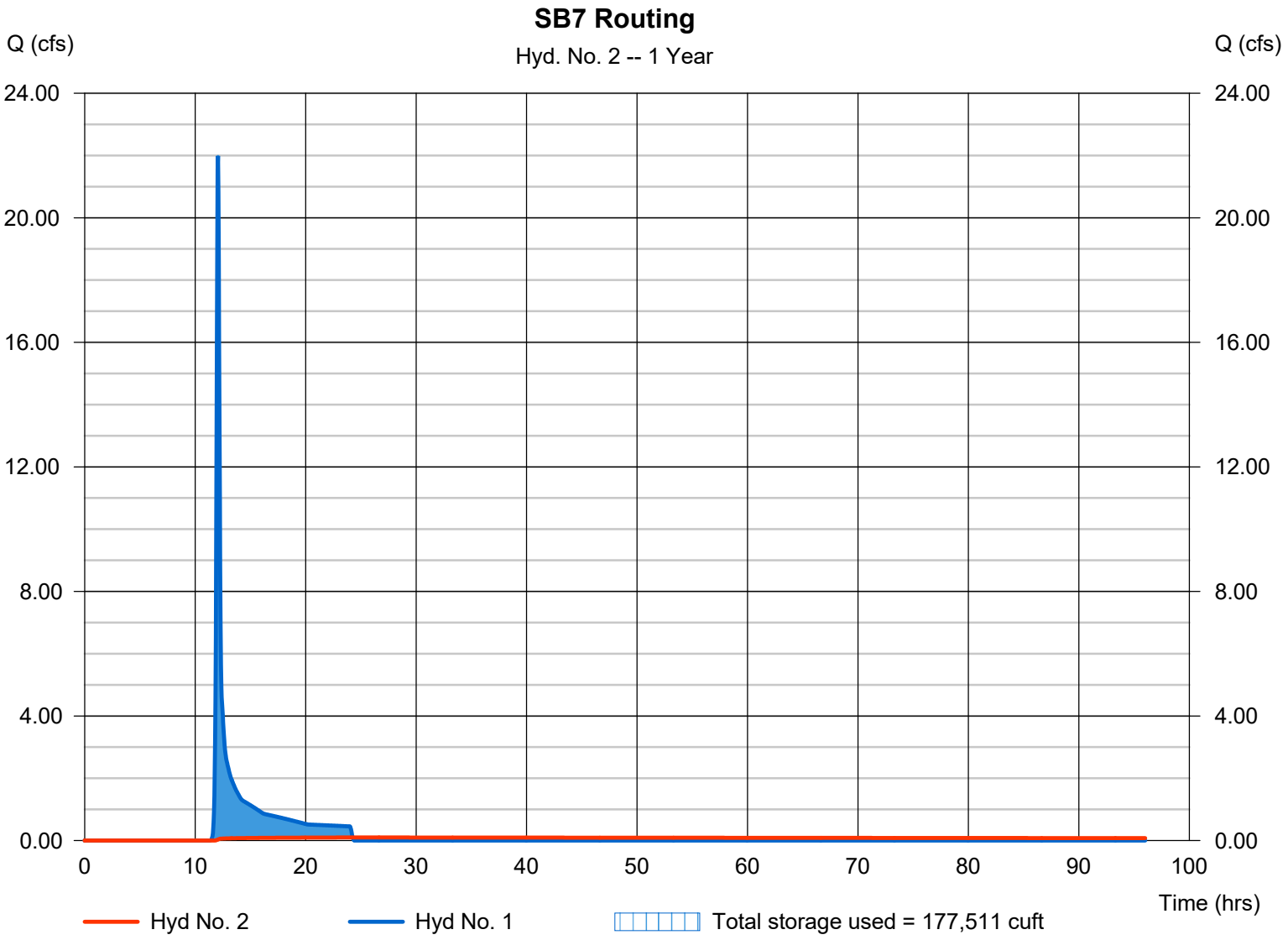
Hydrograph Report

Hyd. No. 2

SB7 Routing

Hydrograph type	=	Reservoir	Peak discharge	=	0.099 cfs
Storm frequency	=	1 yrs	Time to peak	=	24.27 hrs
Time interval	=	2 min	Hyd. volume	=	26,510 cuft
Inflow hyd. No.	=	1 - DA-7 North after road realignment	Max. Elevation	=	276.97 ft
Reservoir name	=	Basin 7	Max. Storage	=	177,511 cuft

Storage Indication method used. Wet pond routing start elevation = 276.00 ft.



Pond Report

Pond No. 1 - Basin 7

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 274.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	274.00	53,715	0	0
2.00	276.00	61,045	114,760	114,760
4.00	278.00	68,374	129,419	244,179
6.00	280.00	75,704	144,078	388,257
8.00	282.00	83,033	158,737	546,994
10.00	284.00	90,363	173,396	720,390

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 42.00	2.00	0.00	0.00
Span (in)	= 42.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 274.00	276.00	0.00	0.00
Length (ft)	= 140.00	1.00	0.00	0.00
Slope (%)	= 10.00	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

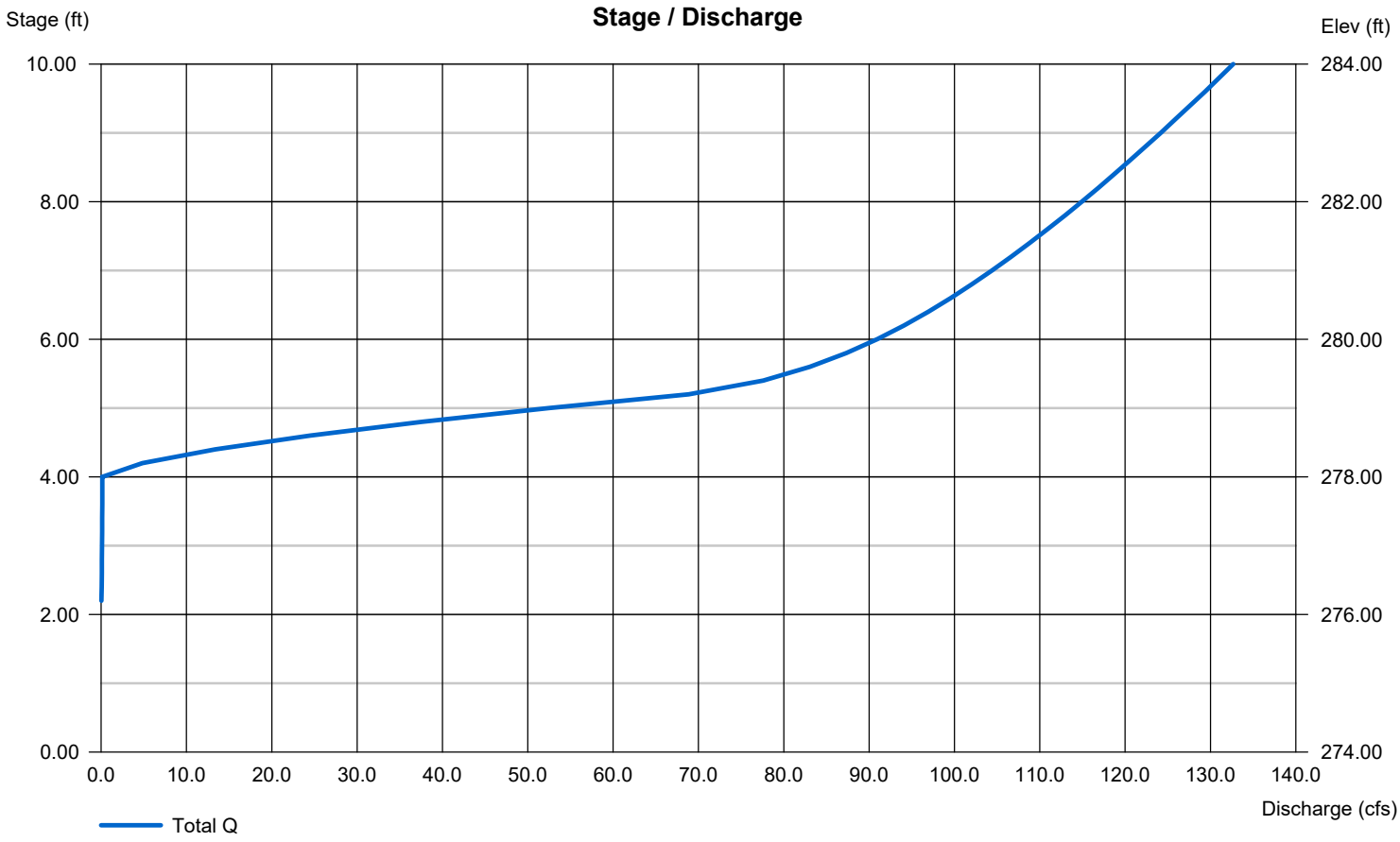
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	0.00	0.00	0.00
Crest El. (ft)	= 278.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

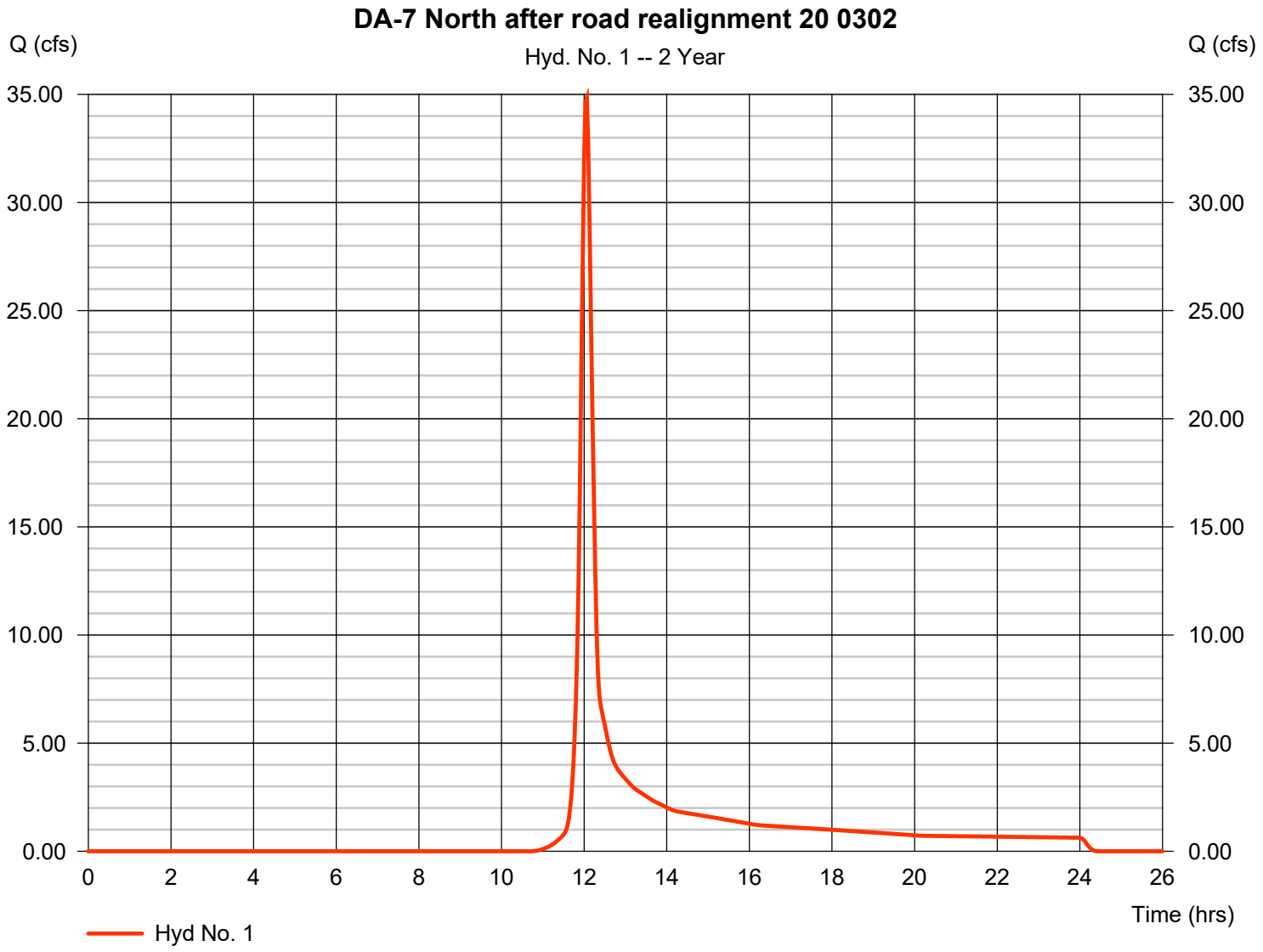


Hydrograph Report

Hyd. No. 1

DA-7 North after road realignment 20 0302

Hydrograph type	= SCS Runoff	Peak discharge	= 34.84 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 101,585 cuft
Drainage area	= 26.000 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.50 min
Total precip.	= 3.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



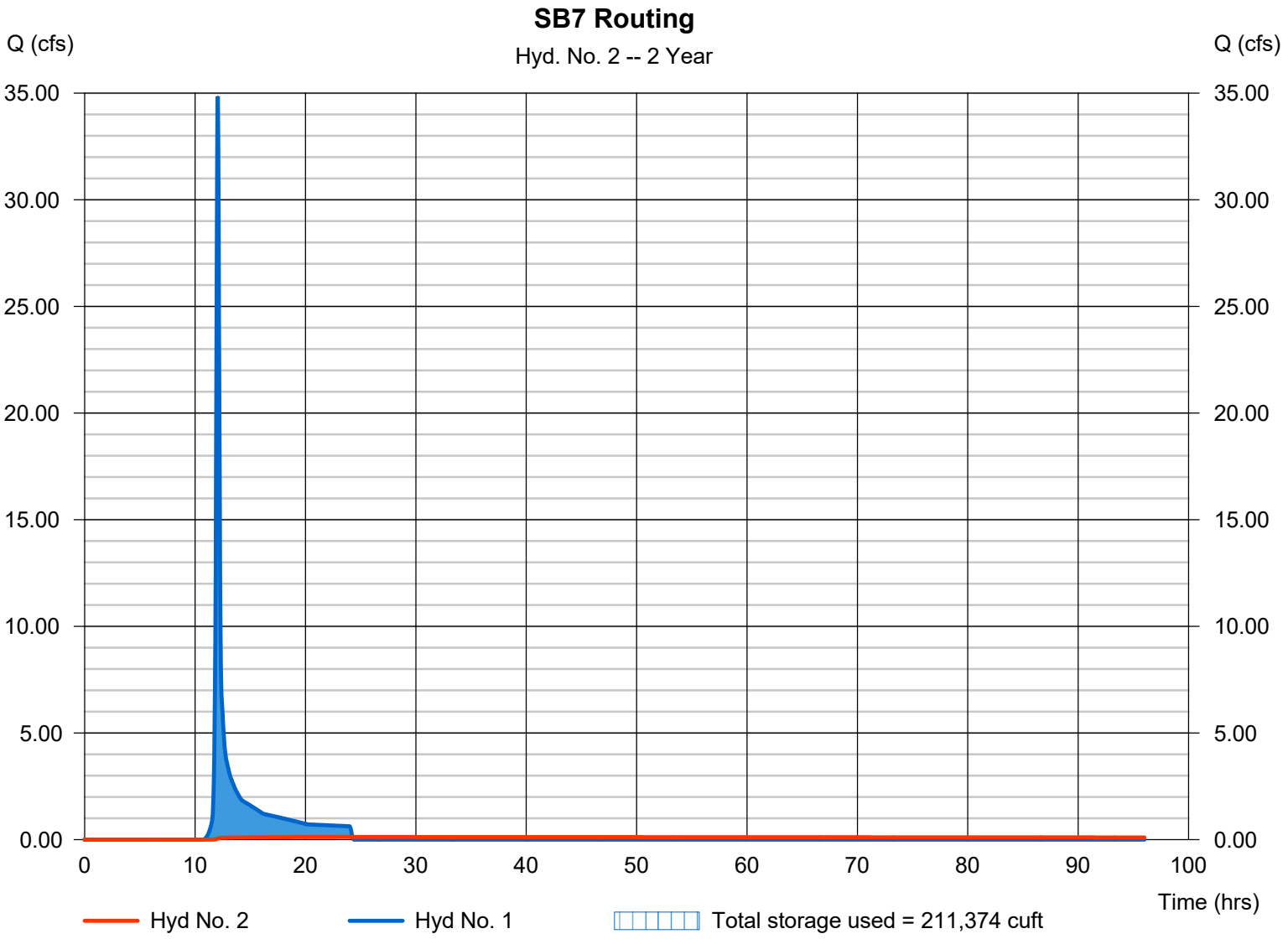
Hydrograph Report

Hyd. No. 2

SB7 Routing

Hydrograph type	=	Reservoir	Peak discharge	=	0.125 cfs
Storm frequency	=	2 yrs	Time to peak	=	24.27 hrs
Time interval	=	2 min	Hyd. volume	=	34,305 cuft
Inflow hyd. No.	=	1 - DA-7 North after road realignment	Max. Elevation	=	277.49 ft
Reservoir name	=	Basin 7	Max. Storage	=	211,374 cuft

Storage Indication method used. Wet pond routing start elevation = 276.00 ft.

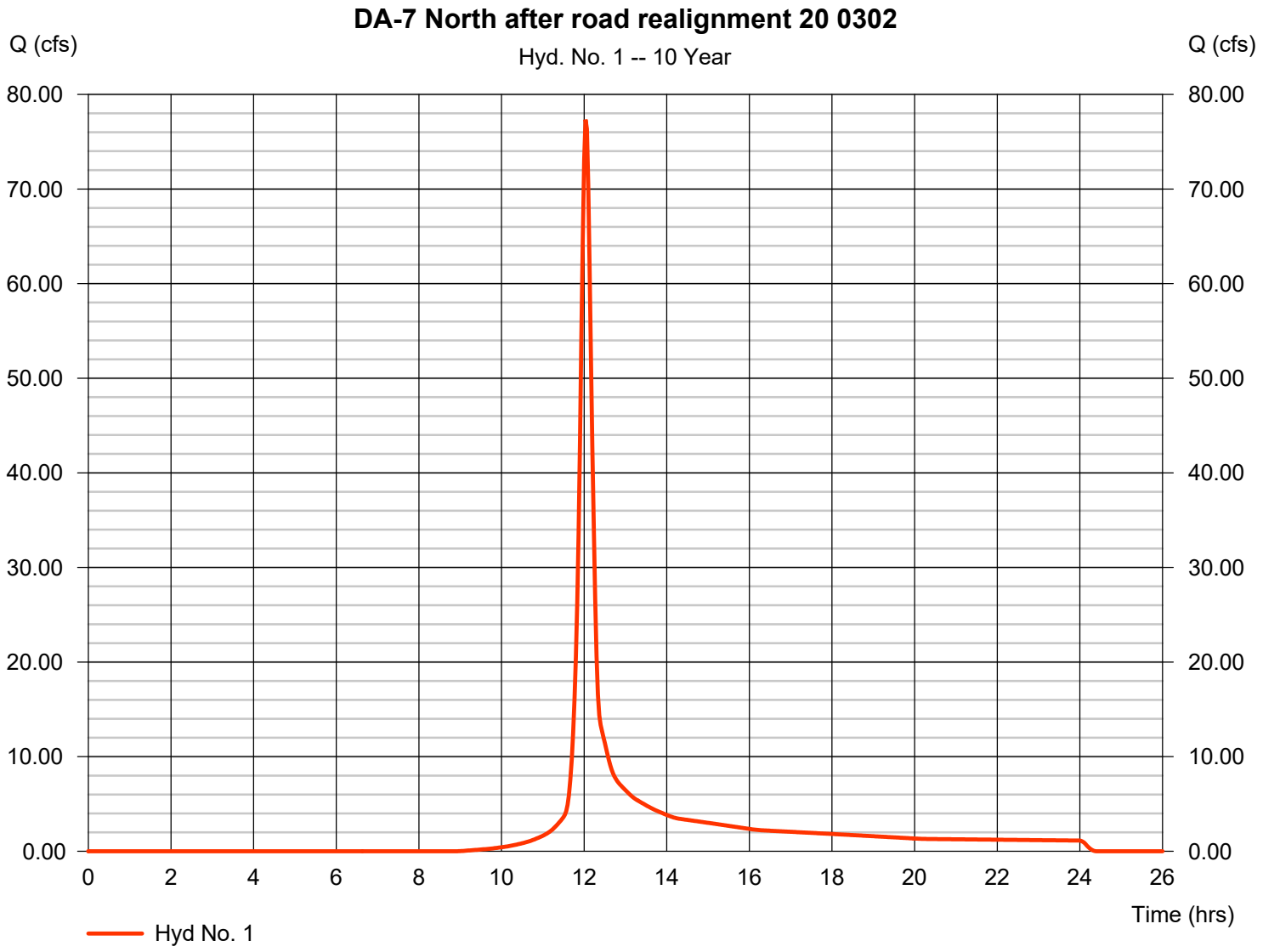


Hydrograph Report

Hyd. No. 1

DA-7 North after road realignment 20 0302

Hydrograph type	=	SCS Runoff	Peak discharge	=	77.34 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	217,560 cuft
Drainage area	=	26.000 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



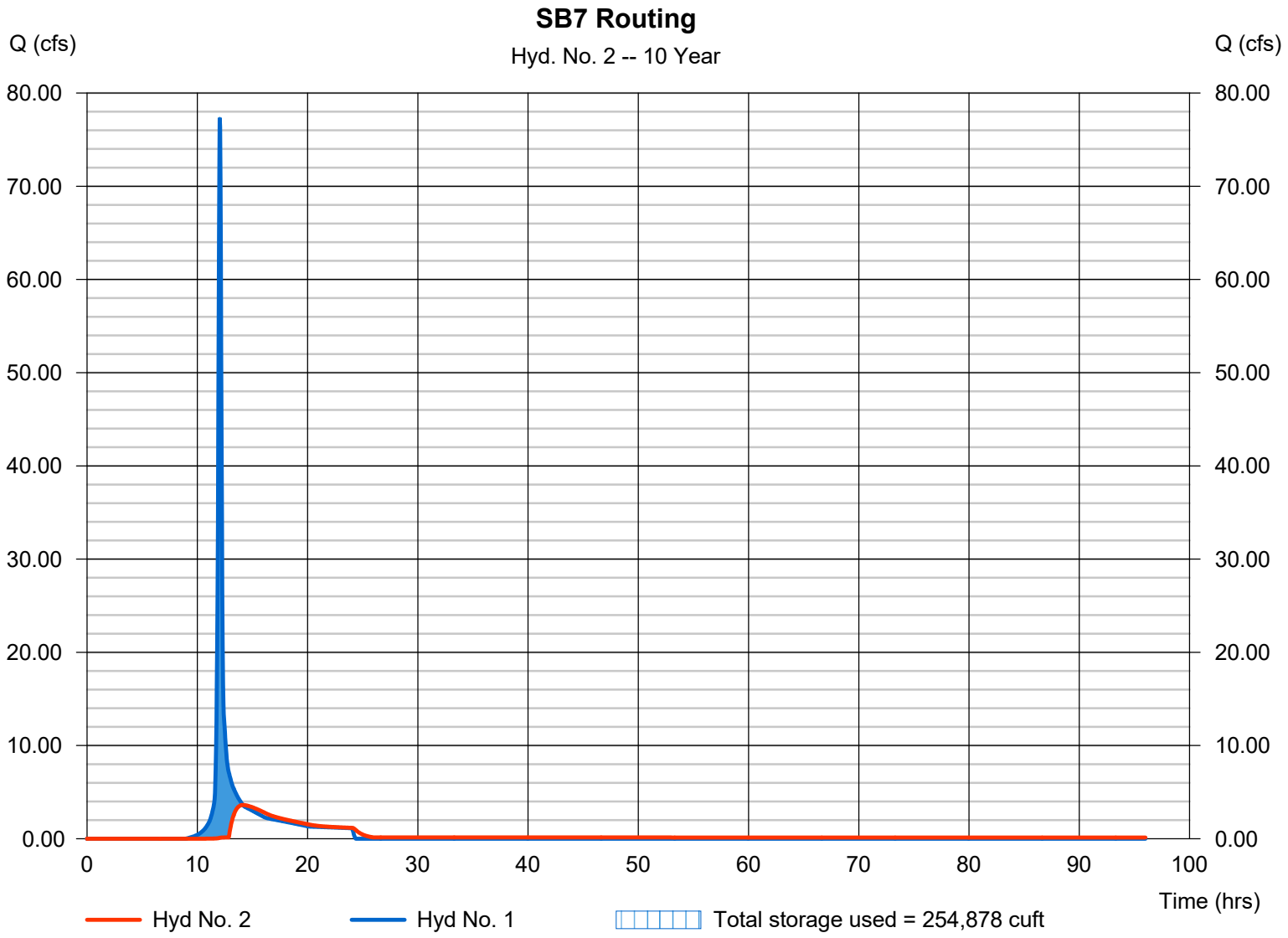
Hydrograph Report

Hyd. No. 2

SB7 Routing

Hydrograph type	=	Reservoir	Peak discharge	=	3.624 cfs
Storm frequency	=	10 yrs	Time to peak	=	14.13 hrs
Time interval	=	2 min	Hyd. volume	=	122,092 cuft
Inflow hyd. No.	=	1 - DA-7 North after road realignment	Max. Elevation	=	278.15 ft
Reservoir name	=	Basin 7	Max. Storage	=	254,878 cuft

Storage Indication method used. Wet pond routing start elevation = 276.00 ft.



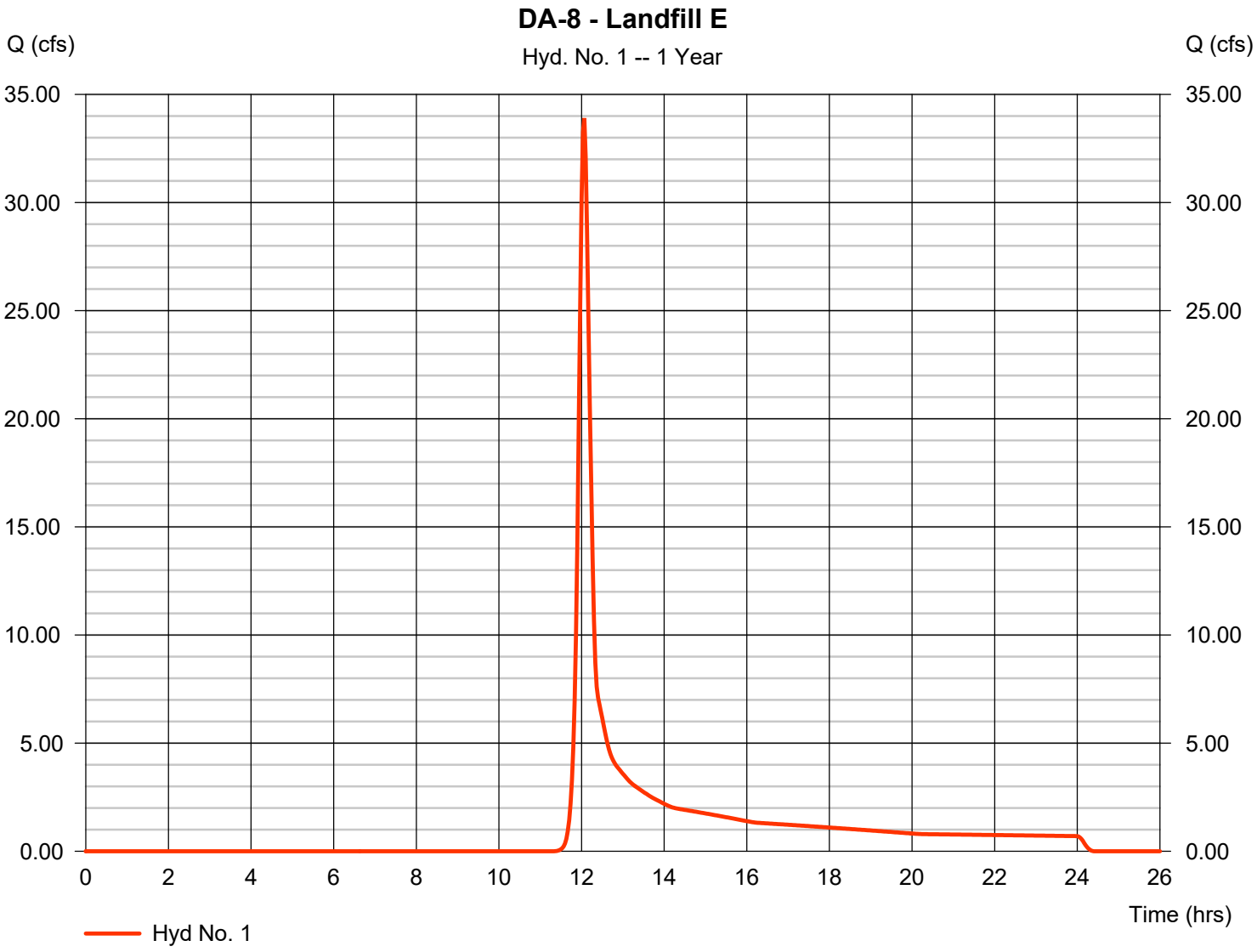
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-8 - Landfill E

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.91 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	102,737 cuft
Drainage area	=	40.100 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



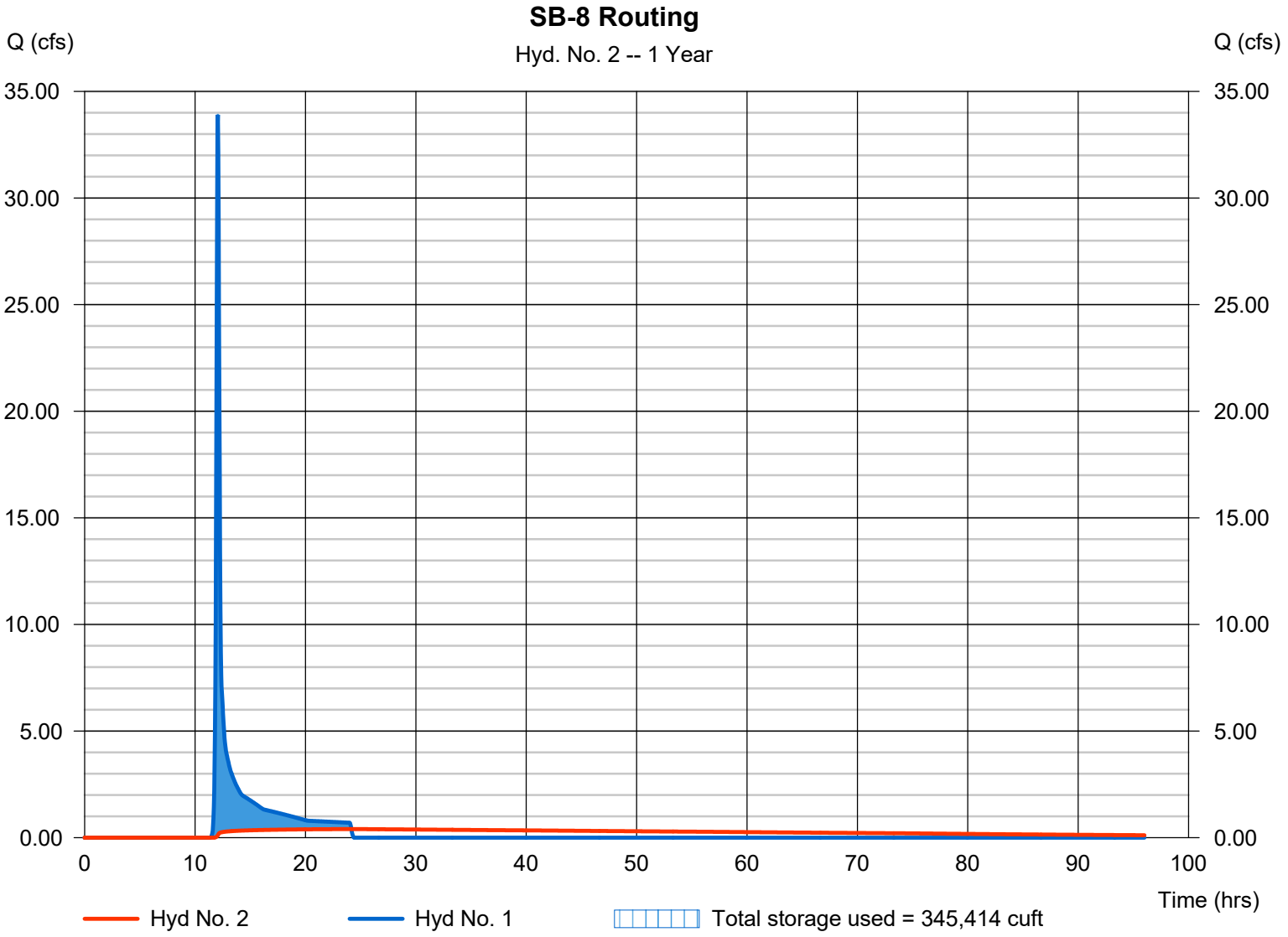
Hydrograph Report

Hyd. No. 2

SB-8 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.405 cfs
Storm frequency	= 1 yrs	Time to peak	= 24.17 hrs
Time interval	= 2 min	Hyd. volume	= 82,956 cuft
Inflow hyd. No.	= 1 - DA-8 - Landfill E	Max. Elevation	= 285.10 ft
Reservoir name	= Basin 8	Max. Storage	= 345,414 cuft

Storage Indication method used. Wet pond routing start elevation = 284.00 ft.



Pond Report

Pond No. 1 - Basin 8

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 280.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	280.00	55,208	0	0
2.00	282.00	64,678	119,886	119,886
4.00	284.00	74,148	138,826	258,712
6.00	286.00	83,619	157,767	416,479
8.00	288.00	93,089	176,708	593,187
10.00	290.00	102,559	195,648	788,835

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 48.00	4.00	0.00	0.00
Span (in)	= 48.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 280.00	284.00	0.00	0.00
Length (ft)	= 155.00	1.00	0.00	0.00
Slope (%)	= 7.70	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

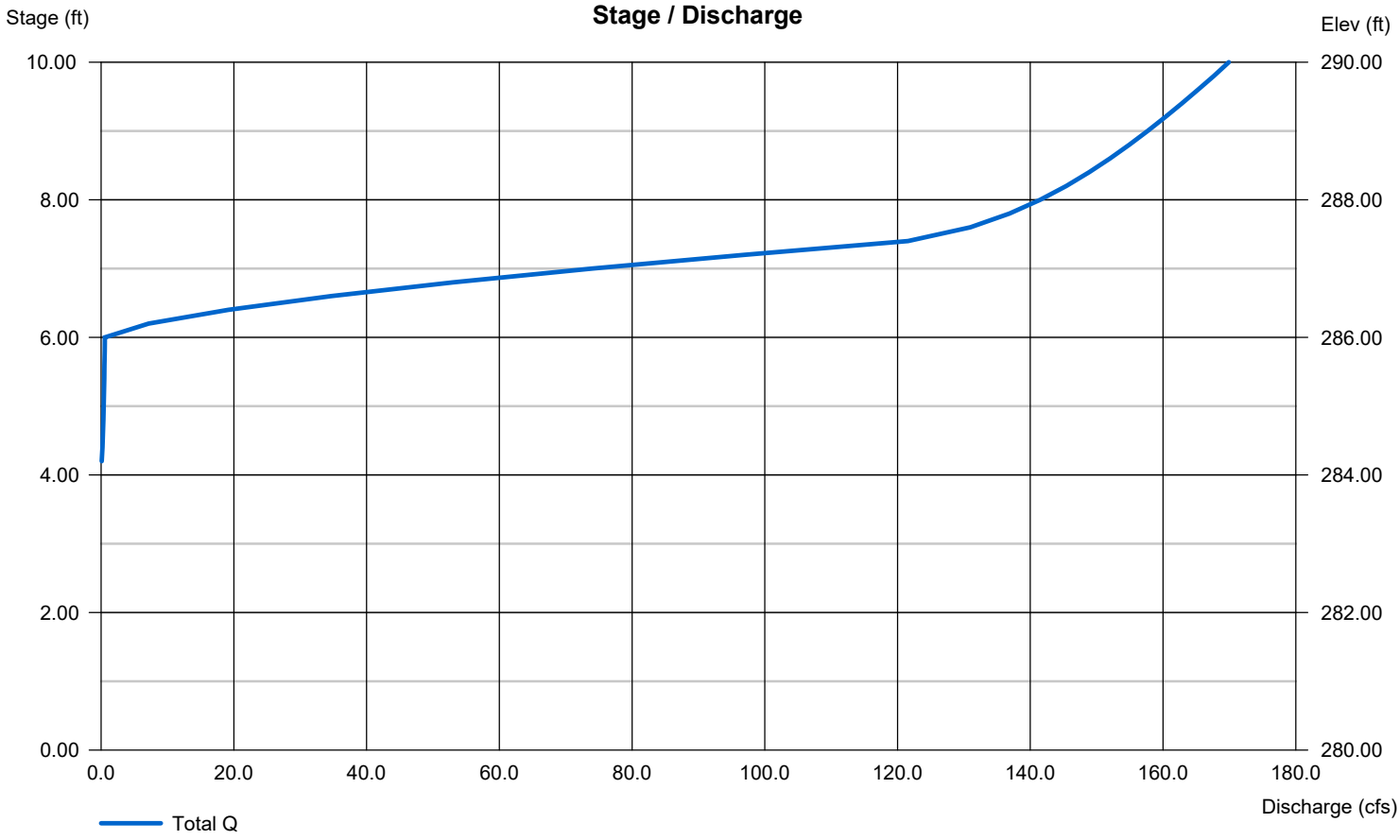
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 21.99	Inactive	0.00	0.00
Crest El. (ft)	= 286.00	307.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

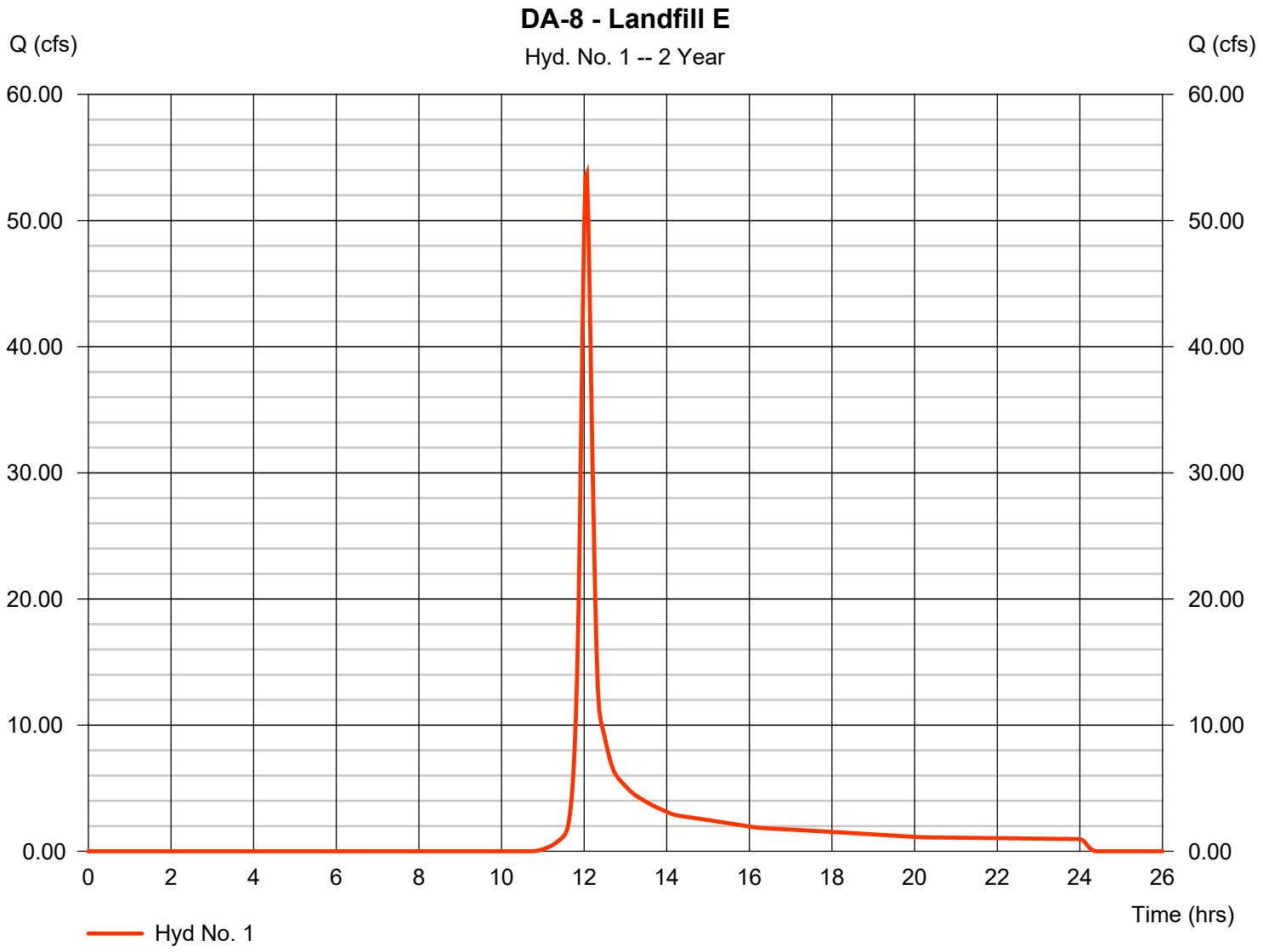


Hydrograph Report

Hyd. No. 1

DA-8 - Landfill E

Hydrograph type	= SCS Runoff	Peak discharge	= 53.74 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 156,675 cuft
Drainage area	= 40.100 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



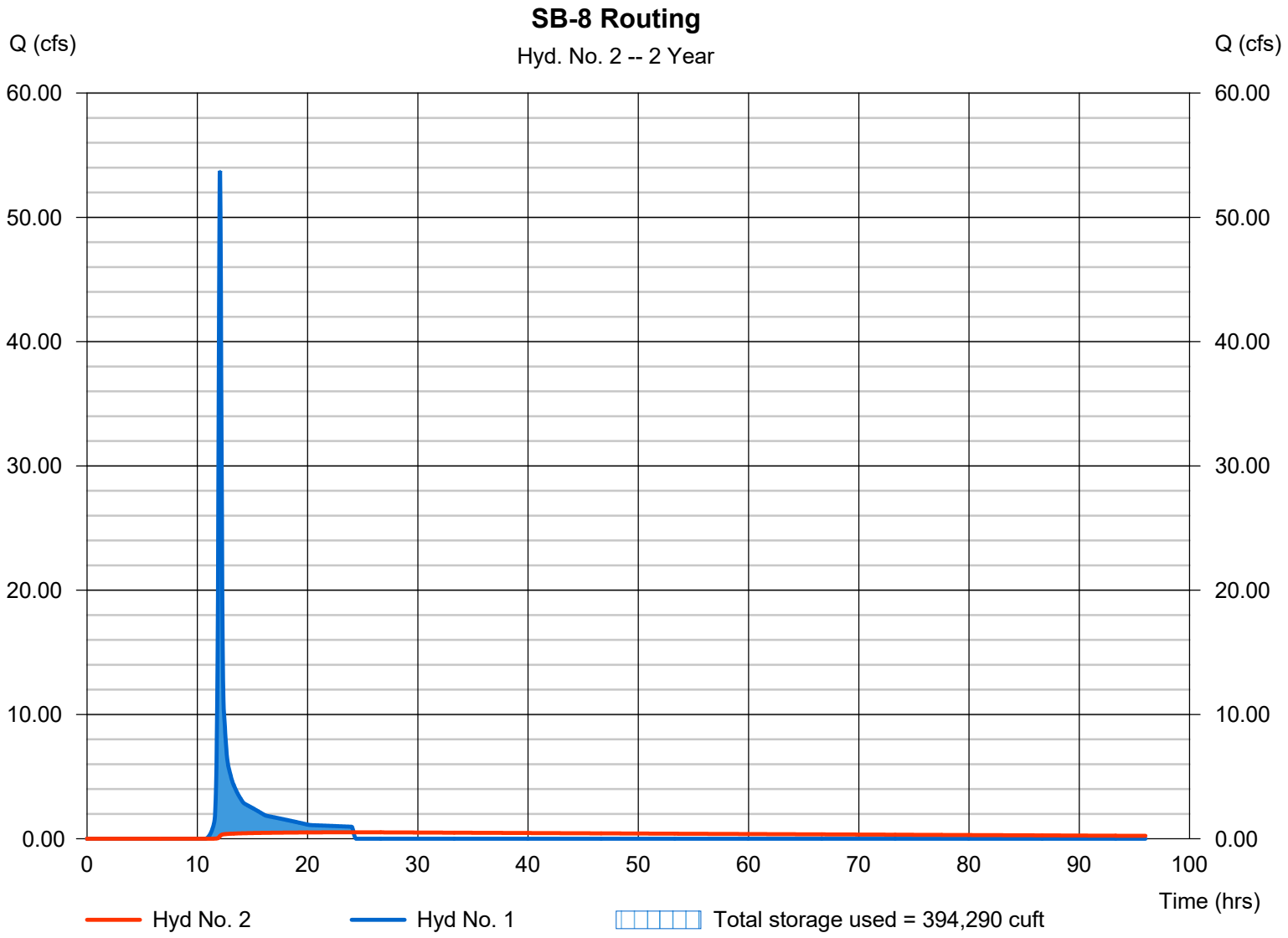
Hydrograph Report

Hyd. No. 2

SB-8 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.523 cfs
Storm frequency	= 2 yrs	Time to peak	= 24.17 hrs
Time interval	= 2 min	Hyd. volume	= 118,845 cuft
Inflow hyd. No.	= 1 - DA-8 - Landfill E	Max. Elevation	= 285.72 ft
Reservoir name	= Basin 8	Max. Storage	= 394,290 cuft

Storage Indication method used. Wet pond routing start elevation = 284.00 ft.

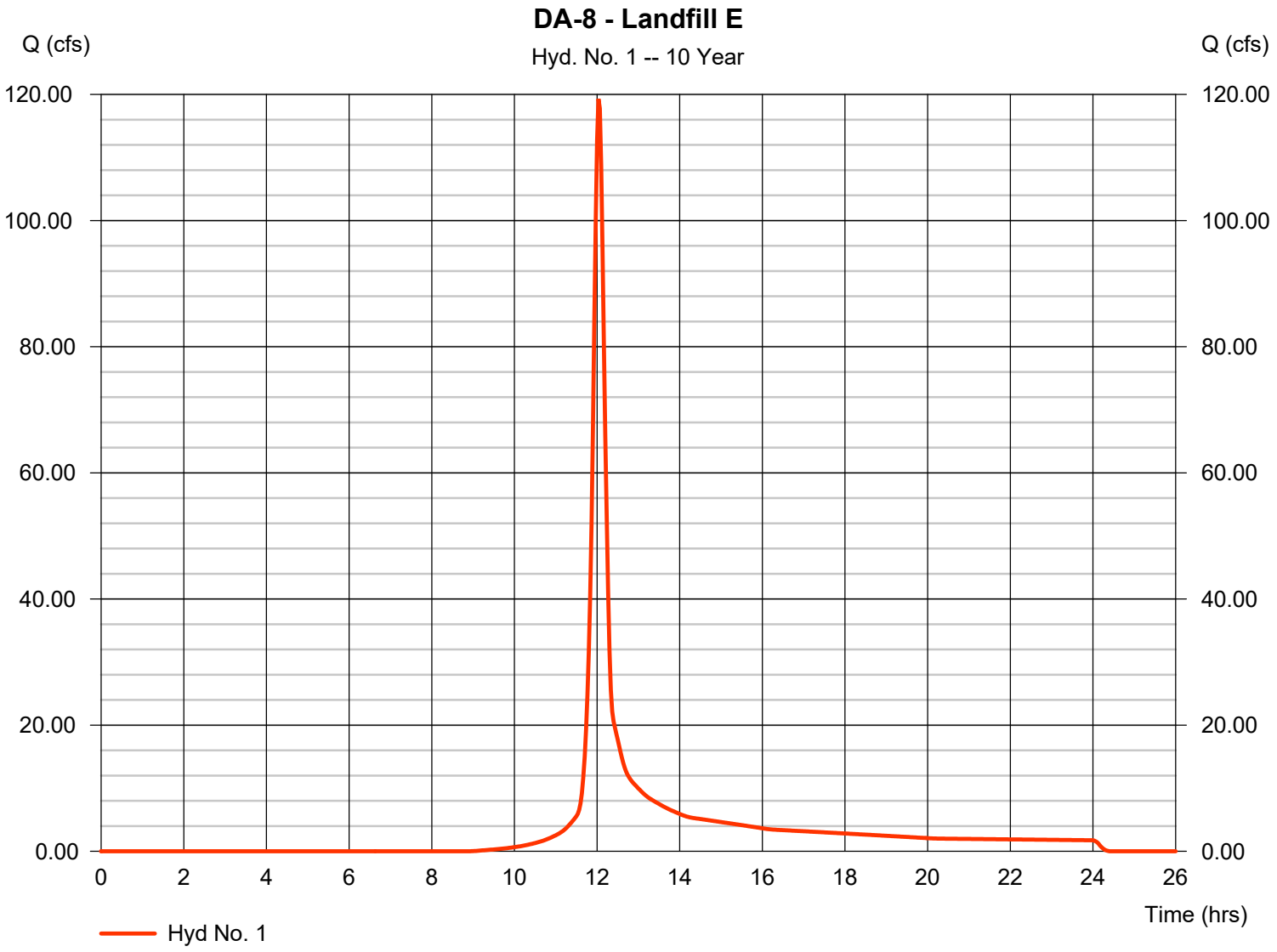


Hydrograph Report

Hyd. No. 1

DA-8 - Landfill E

Hydrograph type	= SCS Runoff	Peak discharge	= 119.28 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 335,544 cuft
Drainage area	= 40.100 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

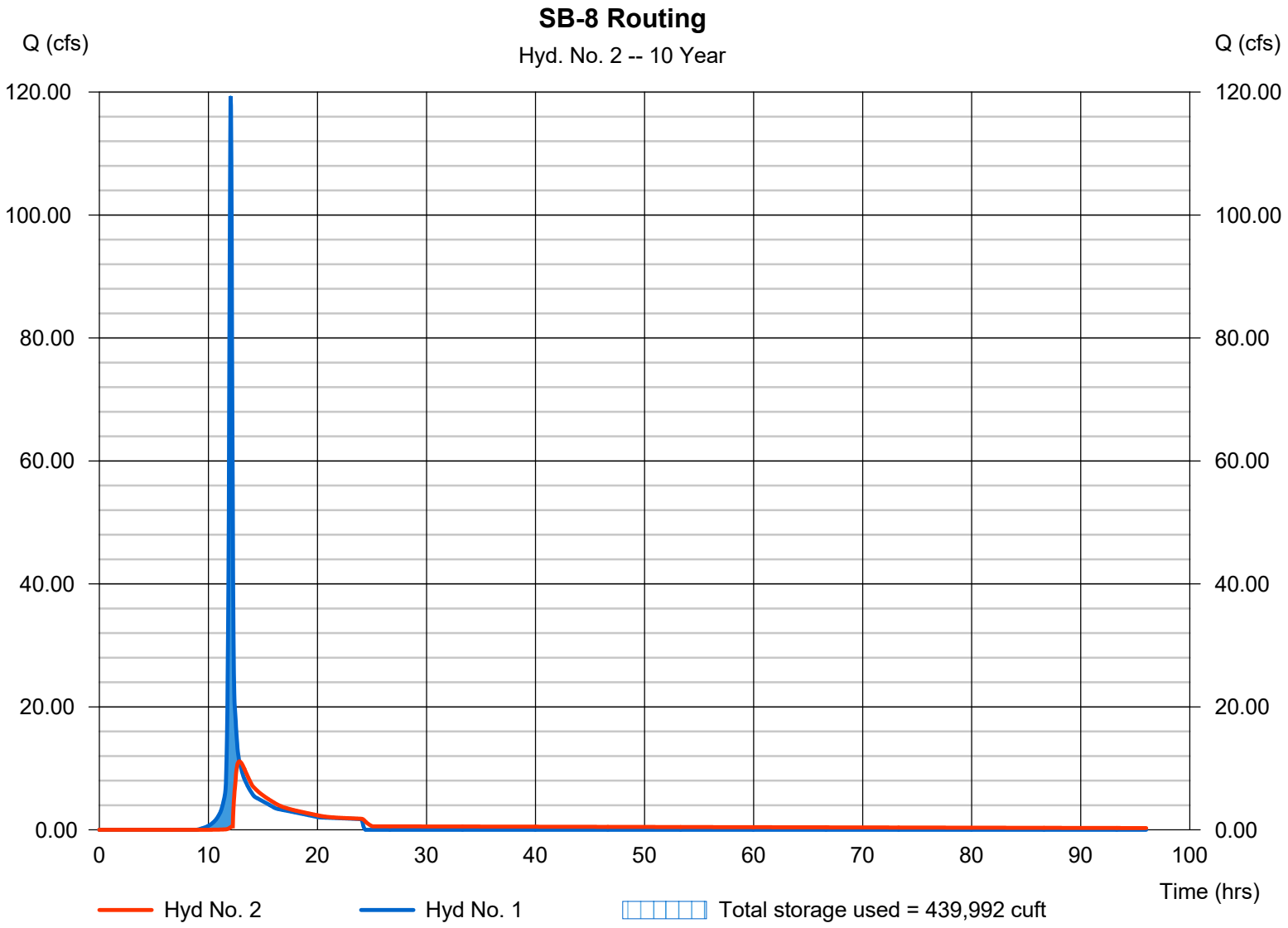
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 2

SB-8 Routing

Hydrograph type	= Reservoir	Peak discharge	= 11.12 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.83 hrs
Time interval	= 2 min	Hyd. volume	= 286,521 cuft
Inflow hyd. No.	= 1 - DA-8 - Landfill E	Max. Elevation	= 286.27 ft
Reservoir name	= Basin 8	Max. Storage	= 439,992 cuft

Storage Indication method used. Wet pond routing start elevation = 284.00 ft.



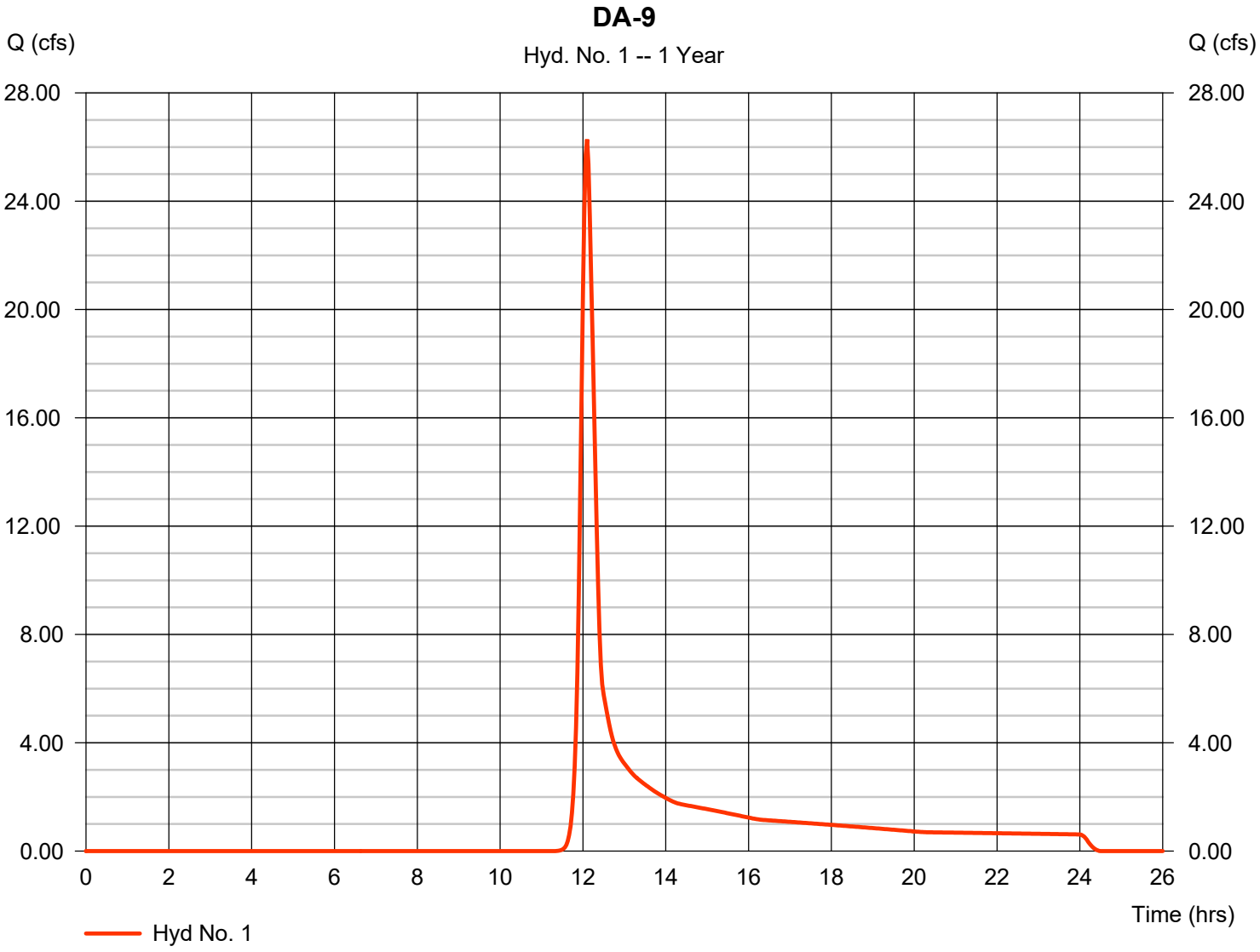
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-9

Hydrograph type	=	SCS Runoff	Peak discharge	=	26.28 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	90,130 cuft
Drainage area	=	34.300 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	17.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

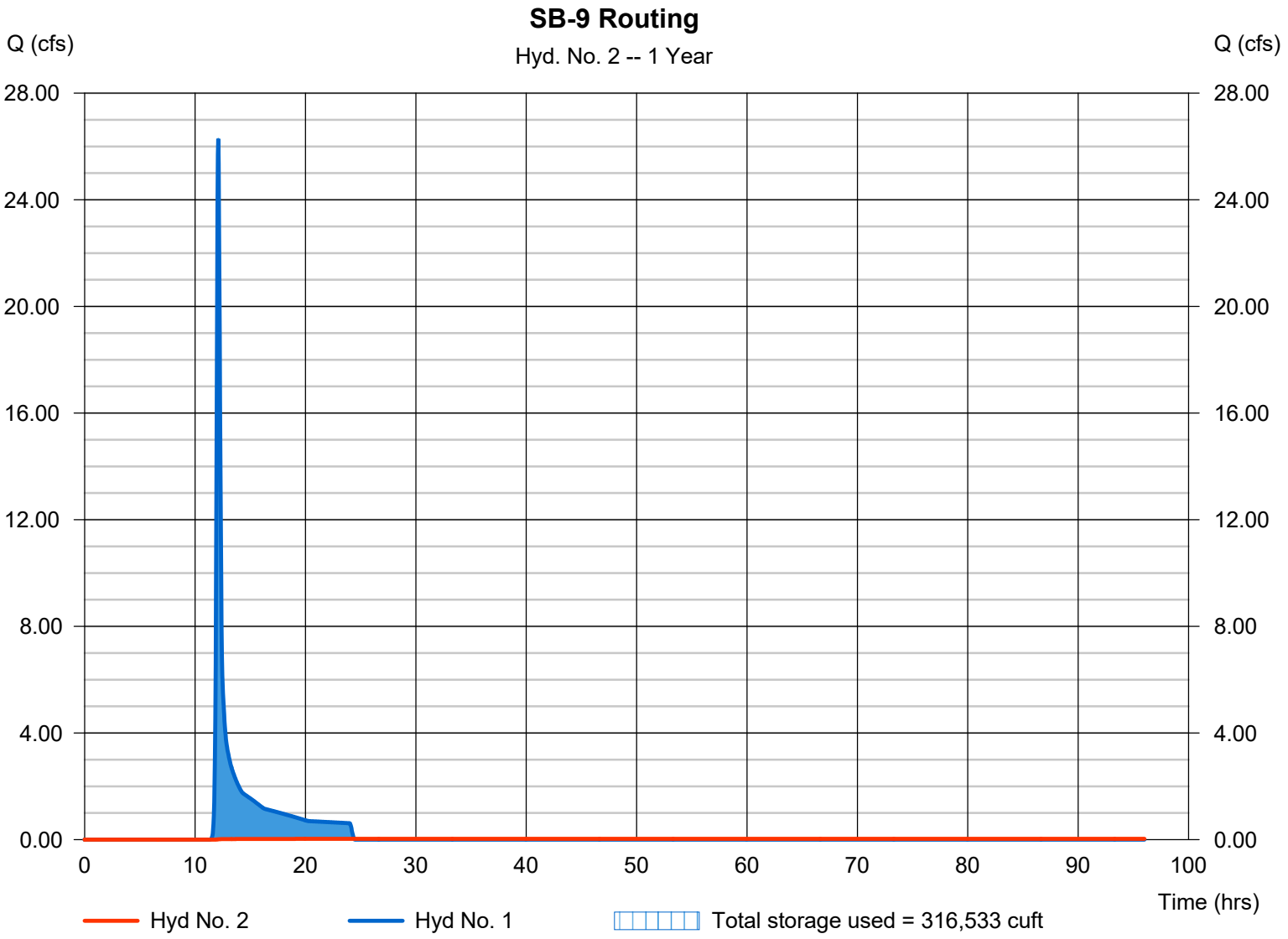
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 2

SB-9 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.030 cfs
Storm frequency	= 1 yrs	Time to peak	= 24.43 hrs
Time interval	= 2 min	Hyd. volume	= 8,747 cuft
Inflow hyd. No.	= 1 - DA-9	Max. Elevation	= 321.35 ft
Reservoir name	= Basin 9	Max. Storage	= 316,533 cuft

Storage Indication method used. Wet pond routing start elevation = 320.00 ft.



Pond Report

Pond No. 1 - Basin 9

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 316.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	316.00	50,374	0	0
2.00	318.00	56,897	107,271	107,271
4.00	320.00	63,419	120,316	227,587
5.50	321.50	68,311	98,798	326,385
6.00	322.00	69,942	34,563	360,948
8.00	324.00	76,465	146,407	507,355
10.00	326.00	82,987	159,452	666,807
12.00	328.00	89,510	172,497	839,304

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 42.00	1.00	18.00	0.00
Span (in)	= 42.00	1.00	18.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 316.00	320.00	321.50	0.00
Length (ft)	= 165.00	1.00	1.00	0.00
Slope (%)	= 13.90	0.10	0.10	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

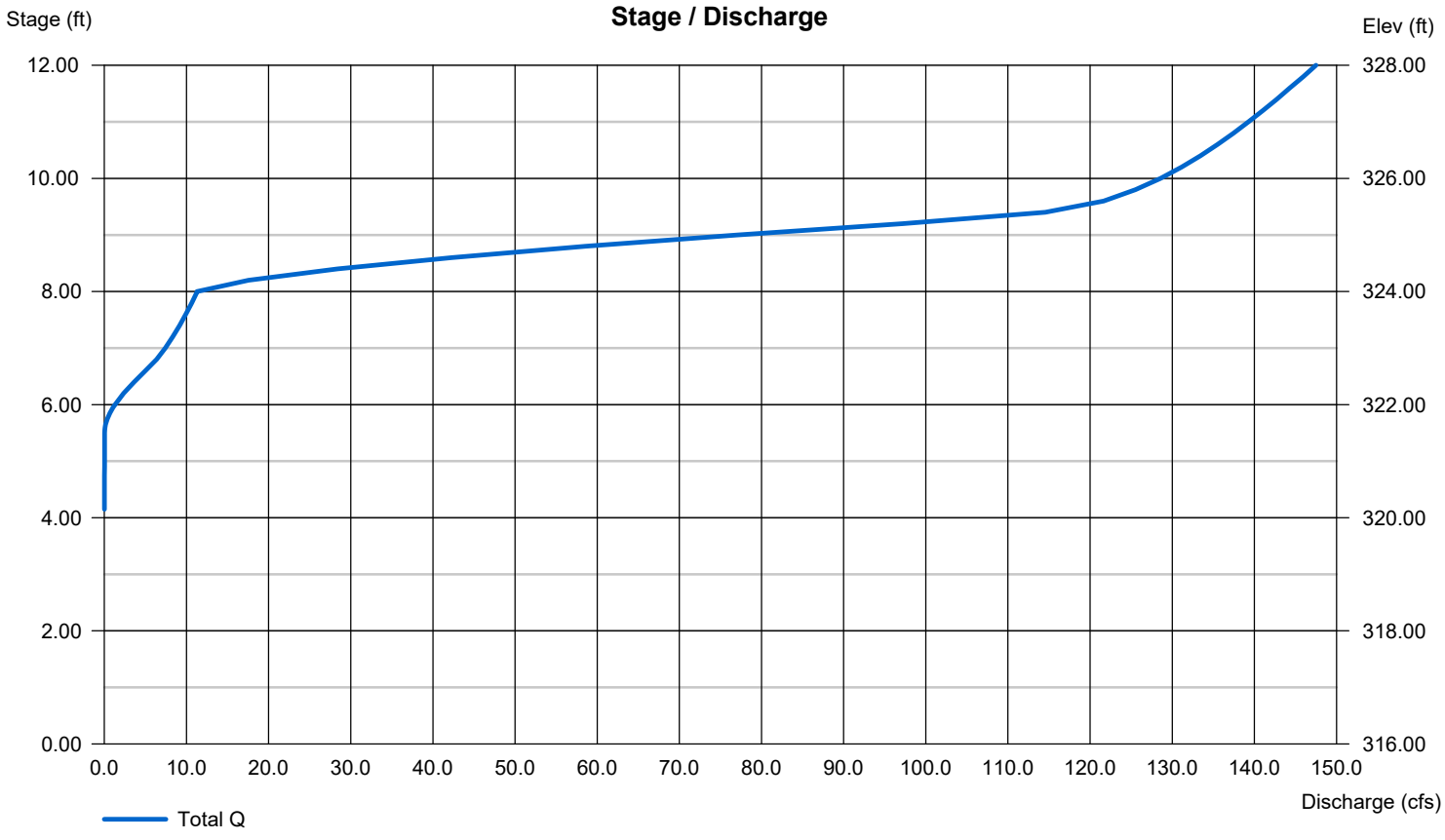
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 18.85	Inactive	0.00	0.00
Crest El. (ft)	= 324.00	328.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

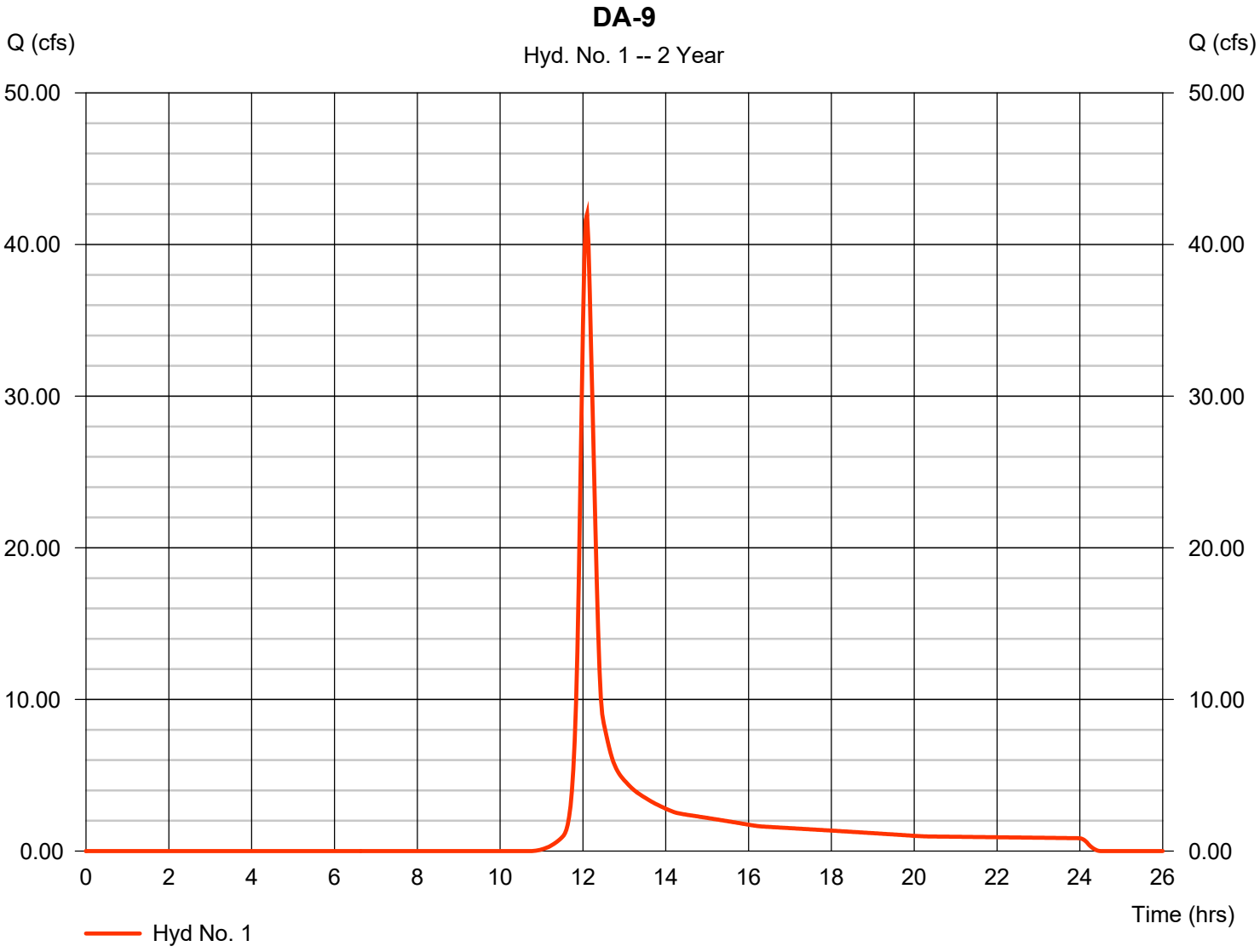


Hydrograph Report

Hyd. No. 1

DA-9

Hydrograph type	=	SCS Runoff	Peak discharge	=	41.98 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	137,450 cuft
Drainage area	=	34.300 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	17.00 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



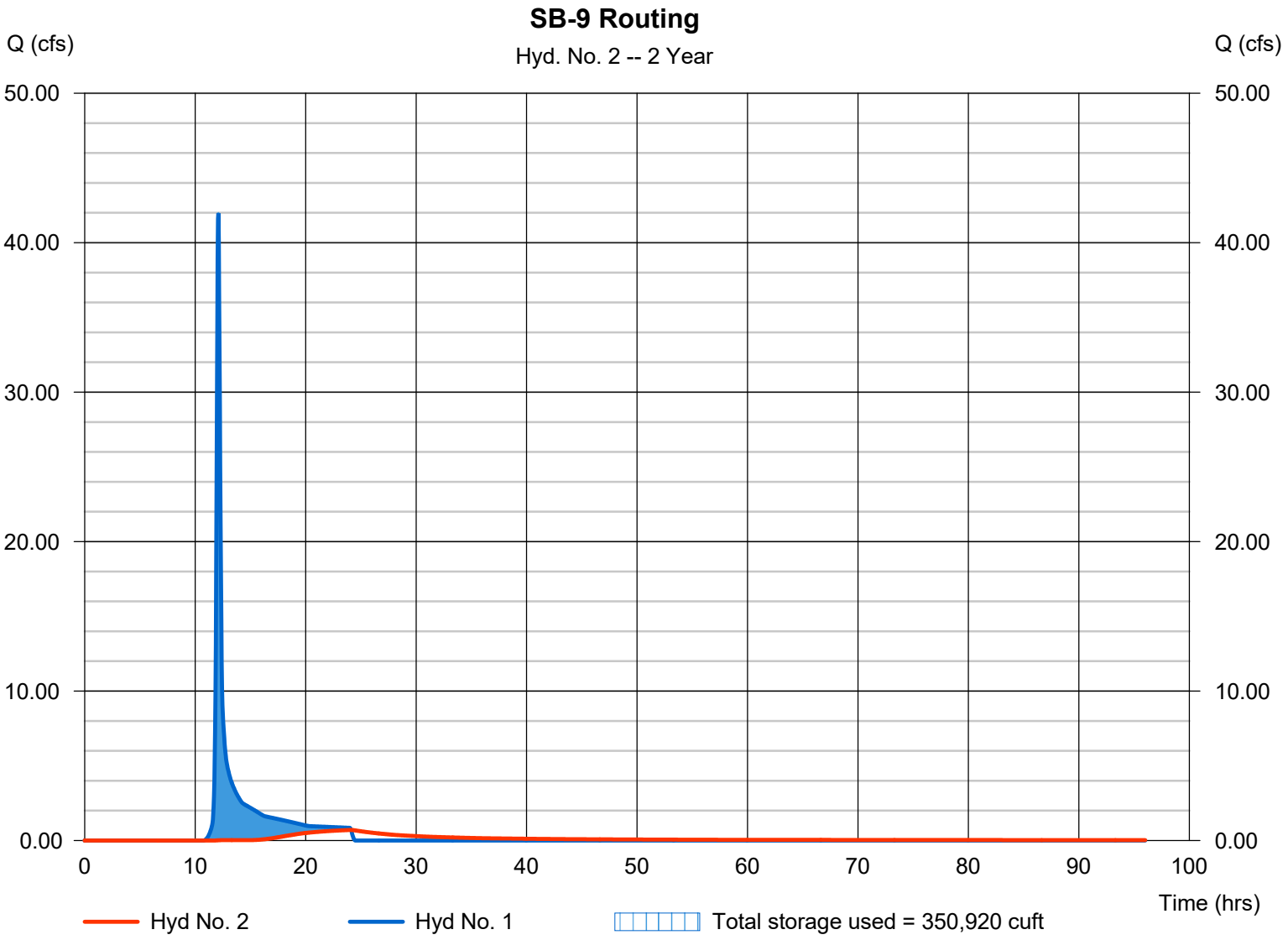
Hydrograph Report

Hyd. No. 2

SB-9 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.706 cfs
Storm frequency	= 2 yrs	Time to peak	= 24.10 hrs
Time interval	= 2 min	Hyd. volume	= 40,113 cuft
Inflow hyd. No.	= 1 - DA-9	Max. Elevation	= 321.85 ft
Reservoir name	= Basin 9	Max. Storage	= 350,920 cuft

Storage Indication method used. Wet pond routing start elevation = 320.00 ft.

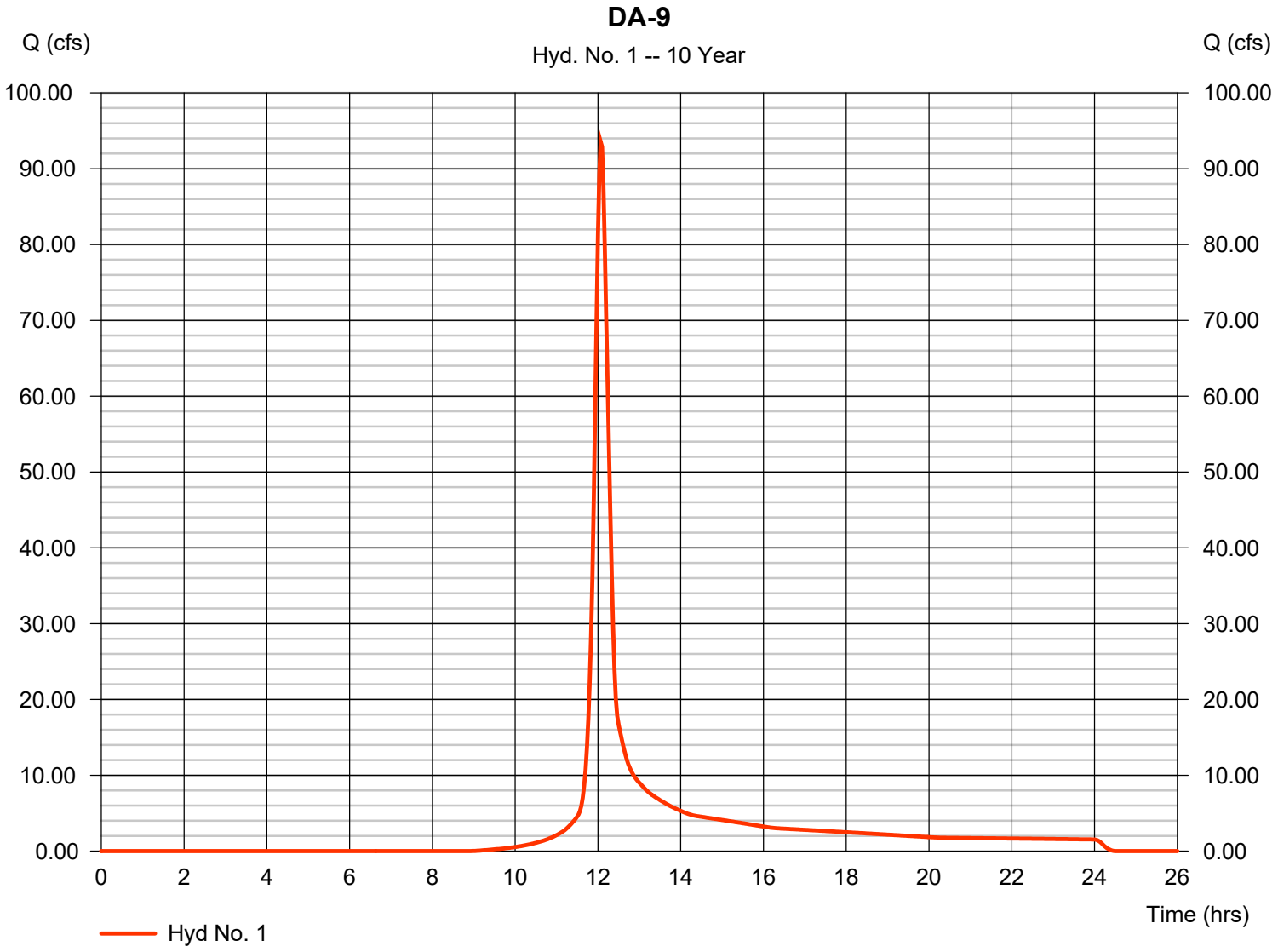


Hydrograph Report

Hyd. No. 1

DA-9

Hydrograph type	=	SCS Runoff	Peak discharge	=	93.54 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	294,371 cuft
Drainage area	=	34.300 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	17.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



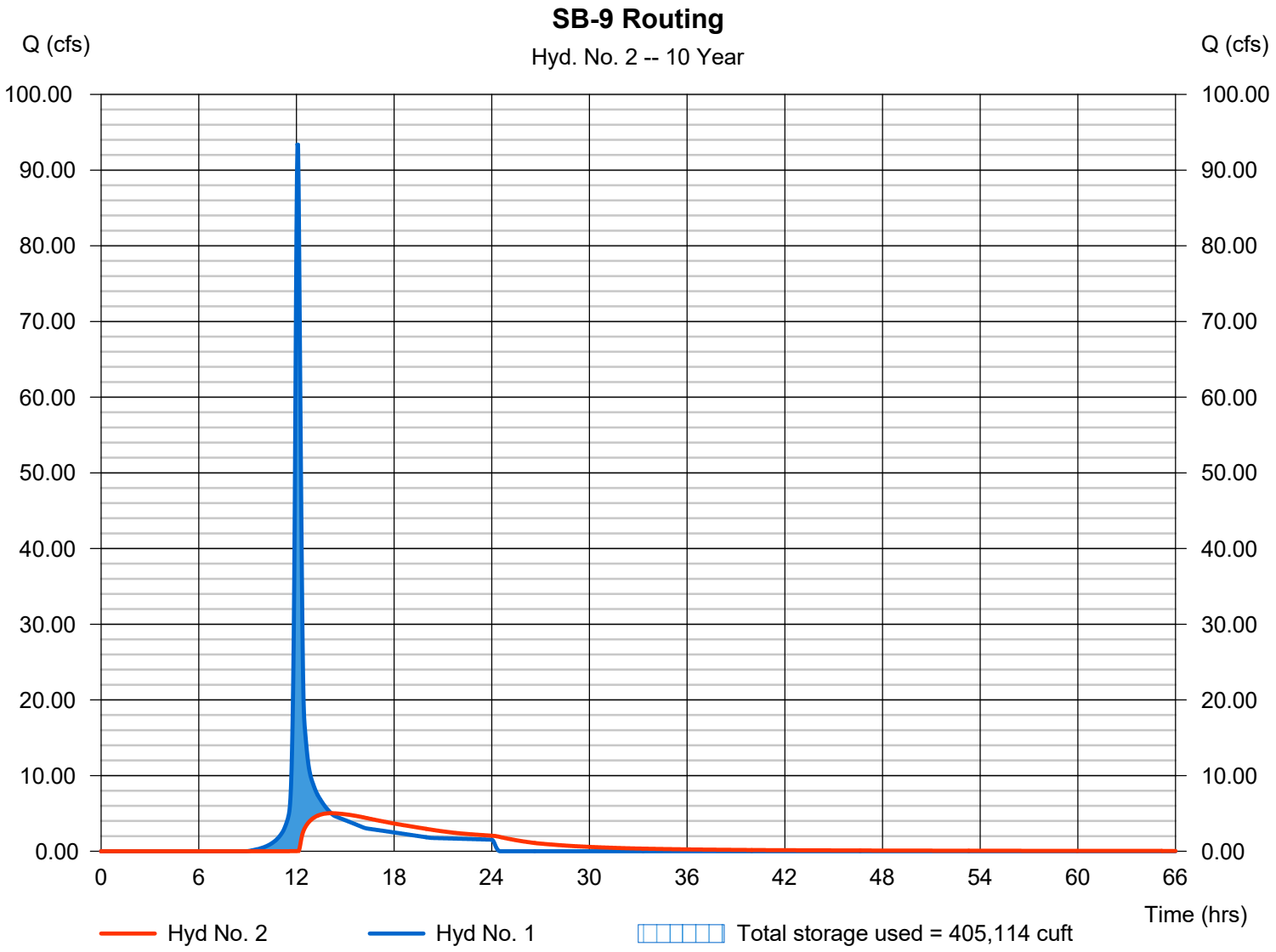
Hydrograph Report

Hyd. No. 2

SB-9 Routing

Hydrograph type	=	Reservoir	Peak discharge	=	5.029 cfs
Storm frequency	=	10 yrs	Time to peak	=	14.13 hrs
Time interval	=	2 min	Hyd. volume	=	196,515 cuft
Inflow hyd. No.	=	1 - DA-9	Max. Elevation	=	322.60 ft
Reservoir name	=	Basin 9	Max. Storage	=	405,114 cuft

Storage Indication method used. Wet pond routing start elevation = 320.00 ft.



Hydrograph Report

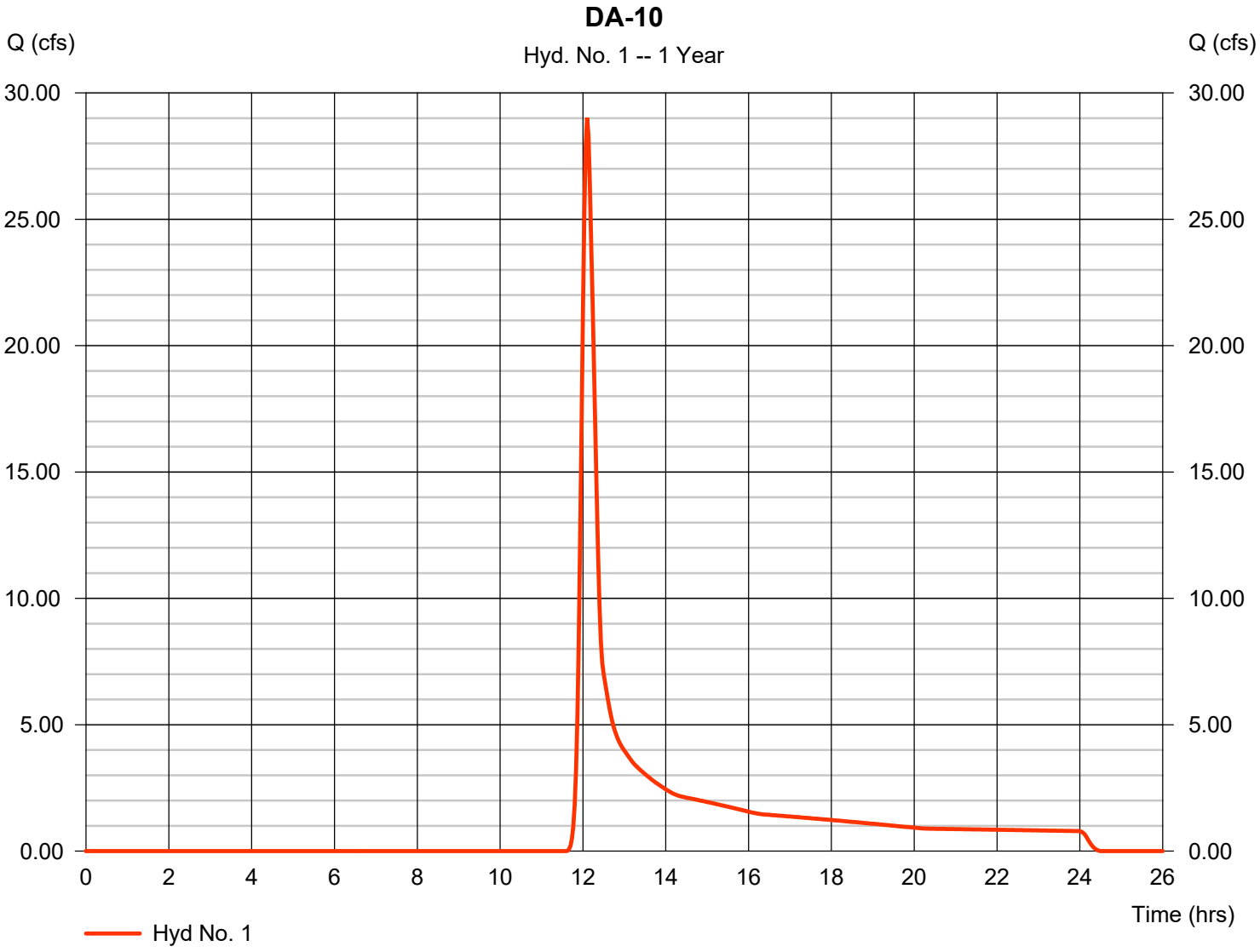
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 1

DA-10

Hydrograph type	= SCS Runoff	Peak discharge	= 29.01 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 106,119 cuft
Drainage area	= 49.200 ac	Curve number	= 71*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.50 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 61) + (41.600 x 74) + (6.700 x 55)] / 49.200



Hydrograph Report

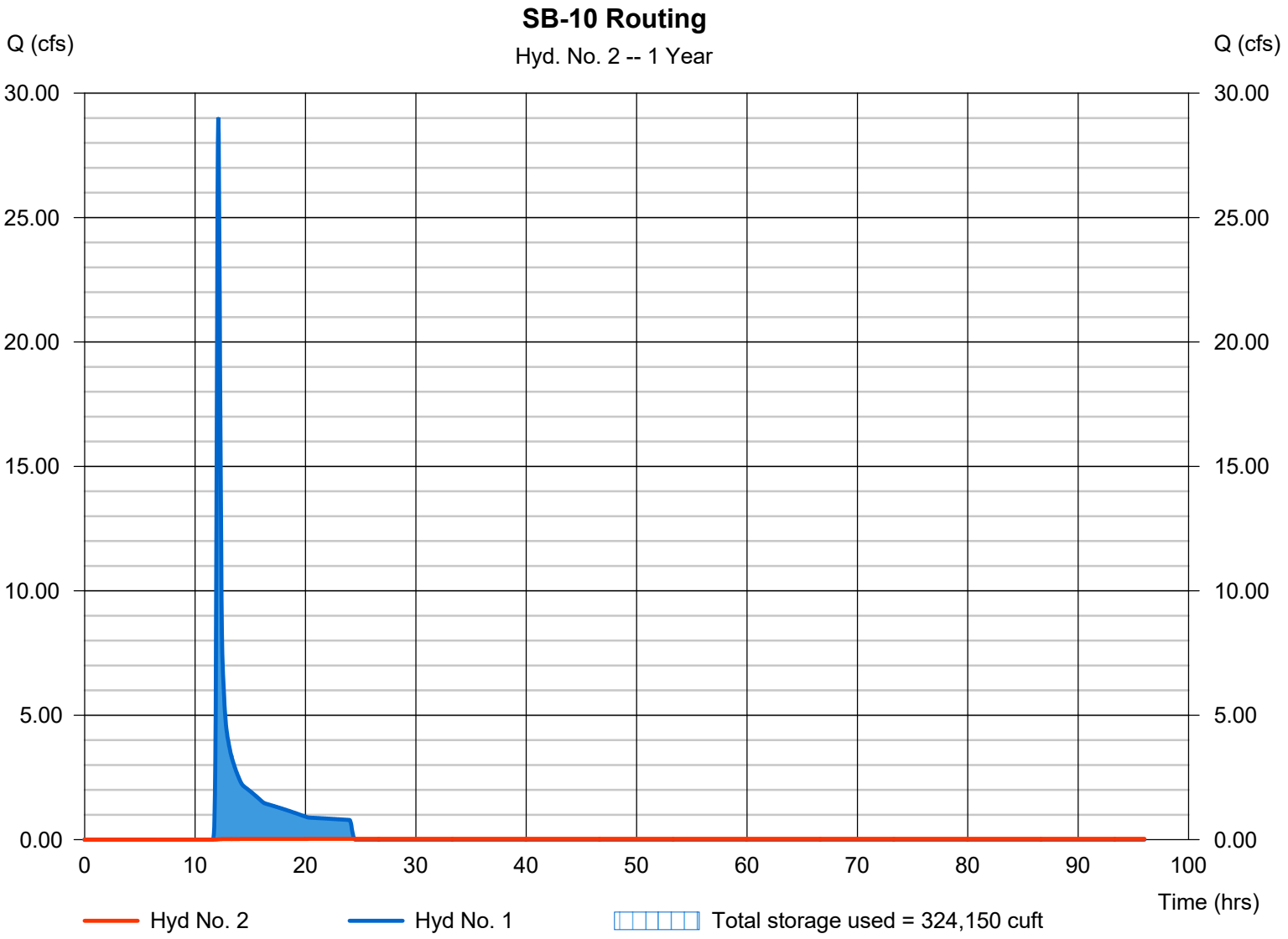
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2019.2 Thursday, 03 / 12 / 2020

Hyd. No. 2

SB-10 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.032 cfs
Storm frequency	= 1 yrs	Time to peak	= 24.43 hrs
Time interval	= 2 min	Hyd. volume	= 9,226 cuft
Inflow hyd. No.	= 1 - DA-10	Max. Elevation	= 341.49 ft
Reservoir name	= Basin 10	Max. Storage	= 324,150 cuft

Storage Indication method used. Wet pond routing start elevation = 340.00 ft.



Pond Report

Pond No. 1 - Basin 10

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 334.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	334.00	21,015	0	0
2.00	336.00	24,177	45,192	45,192
4.00	338.00	42,849	67,026	112,218
6.00	340.00	64,205	107,054	219,272
7.00	341.00	71,729	67,967	287,239
8.00	342.00	79,254	75,492	362,731
10.00	344.00	120,553	199,807	562,538
12.00	346.00	167,645	288,198	850,736

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 48.00	1.00	0.00	0.00
Span (in)	= 48.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 334.00	340.00	0.00	0.00
Length (ft)	= 85.00	1.00	0.00	0.00
Slope (%)	= 3.50	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

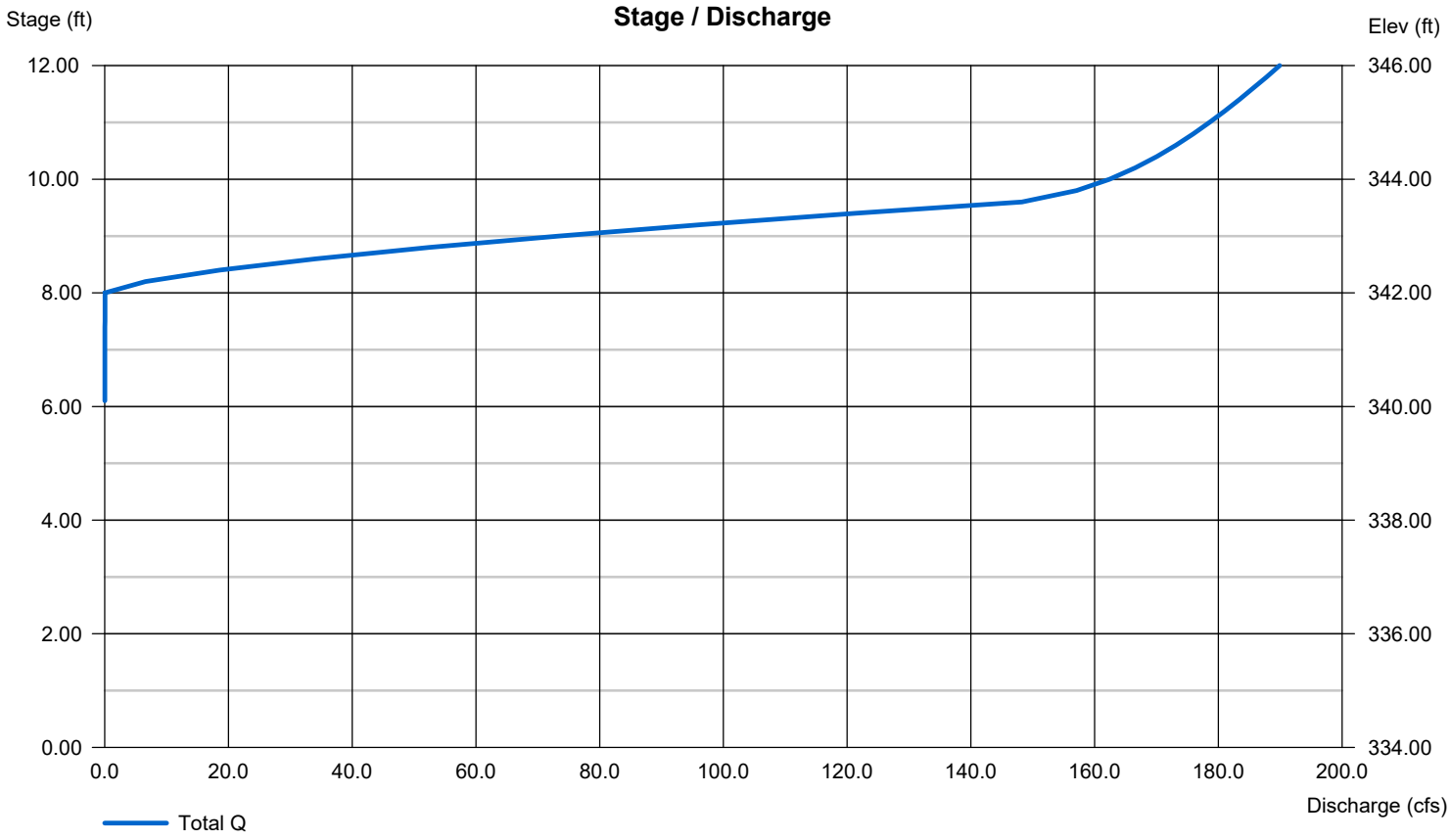
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 21.99	Inactive	0.00	0.00
Crest El. (ft)	= 342.00	358.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



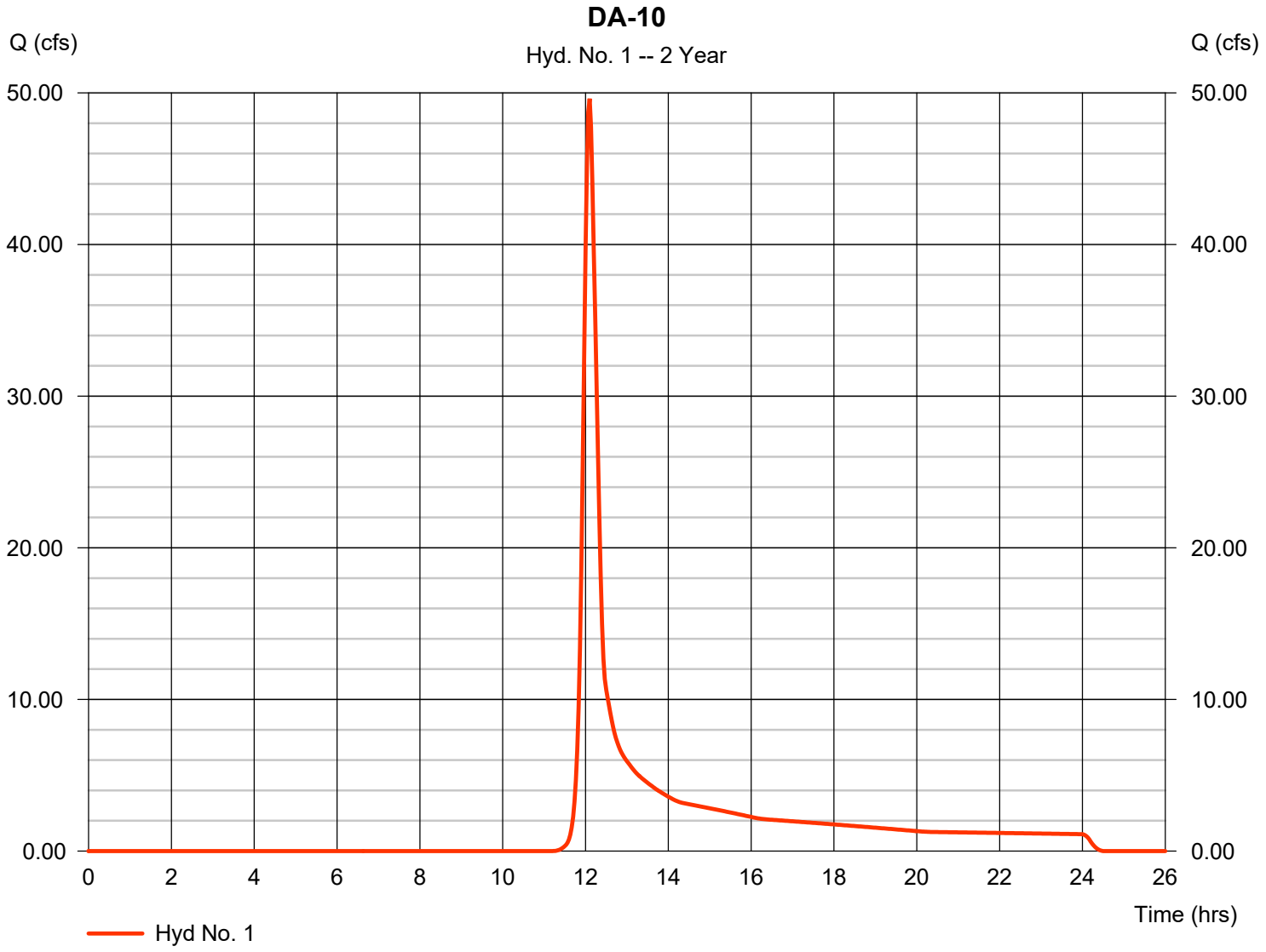
Hydrograph Report

Hyd. No. 1

DA-10

Hydrograph type	=	SCS Runoff	Peak discharge	=	49.62 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	167,669 cuft
Drainage area	=	49.200 ac	Curve number	=	71*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.50 min
Total precip.	=	3.30 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.900 x 61) + (41.600 x 74) + (6.700 x 55)] / 49.200



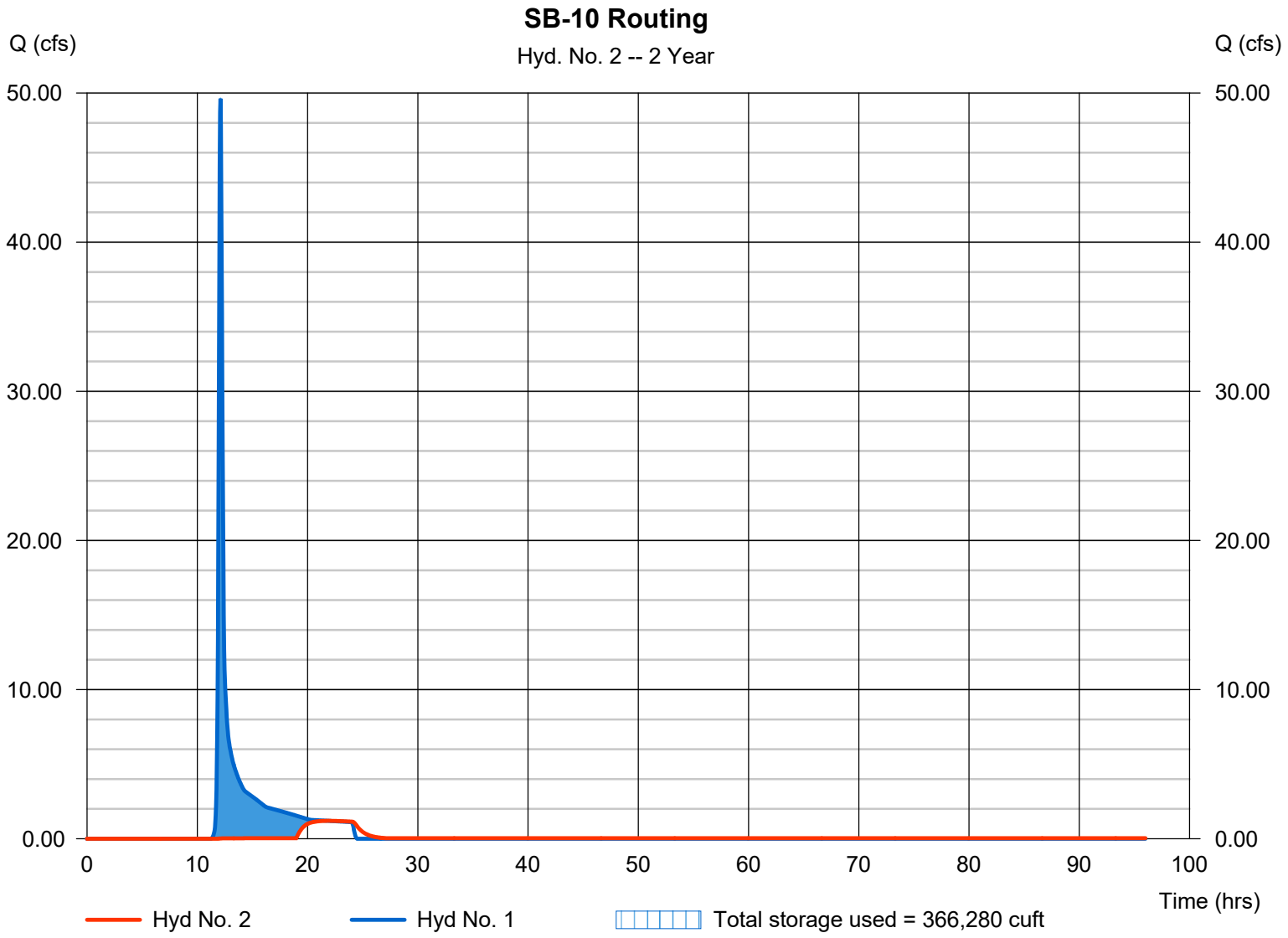
Hydrograph Report

Hyd. No. 2

SB-10 Routing

Hydrograph type	= Reservoir	Peak discharge	= 1.201 cfs
Storm frequency	= 2 yrs	Time to peak	= 21.87 hrs
Time interval	= 2 min	Hyd. volume	= 33,181 cuft
Inflow hyd. No.	= 1 - DA-10	Max. Elevation	= 342.04 ft
Reservoir name	= Basin 10	Max. Storage	= 366,280 cuft

Storage Indication method used. Wet pond routing start elevation = 340.00 ft.



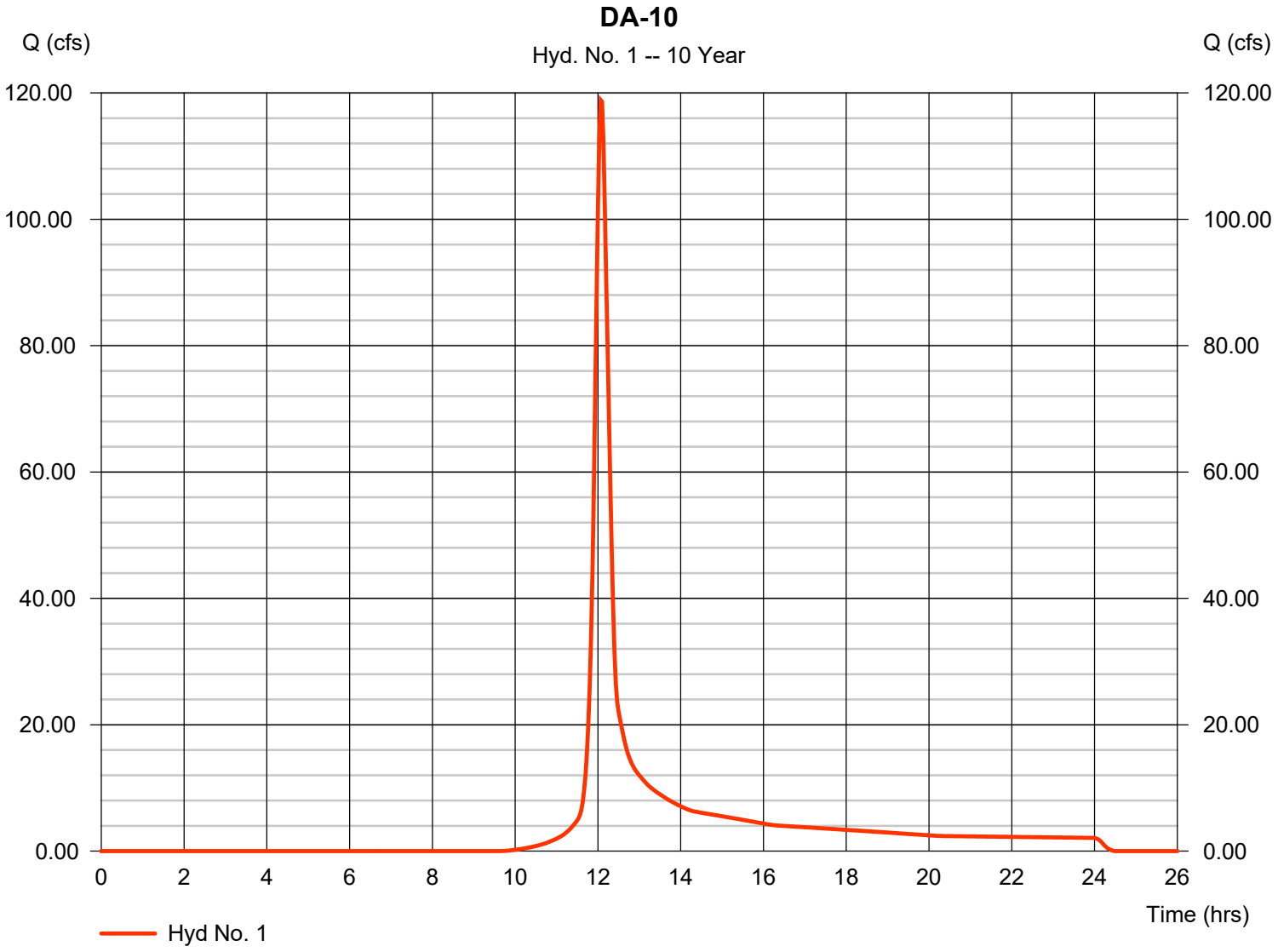
Hydrograph Report

Hyd. No. 1

DA-10

Hydrograph type	=	SCS Runoff	Peak discharge	=	118.87 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	377,997 cuft
Drainage area	=	49.200 ac	Curve number	=	71*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.900 x 61) + (41.600 x 74) + (6.700 x 55)] / 49.200



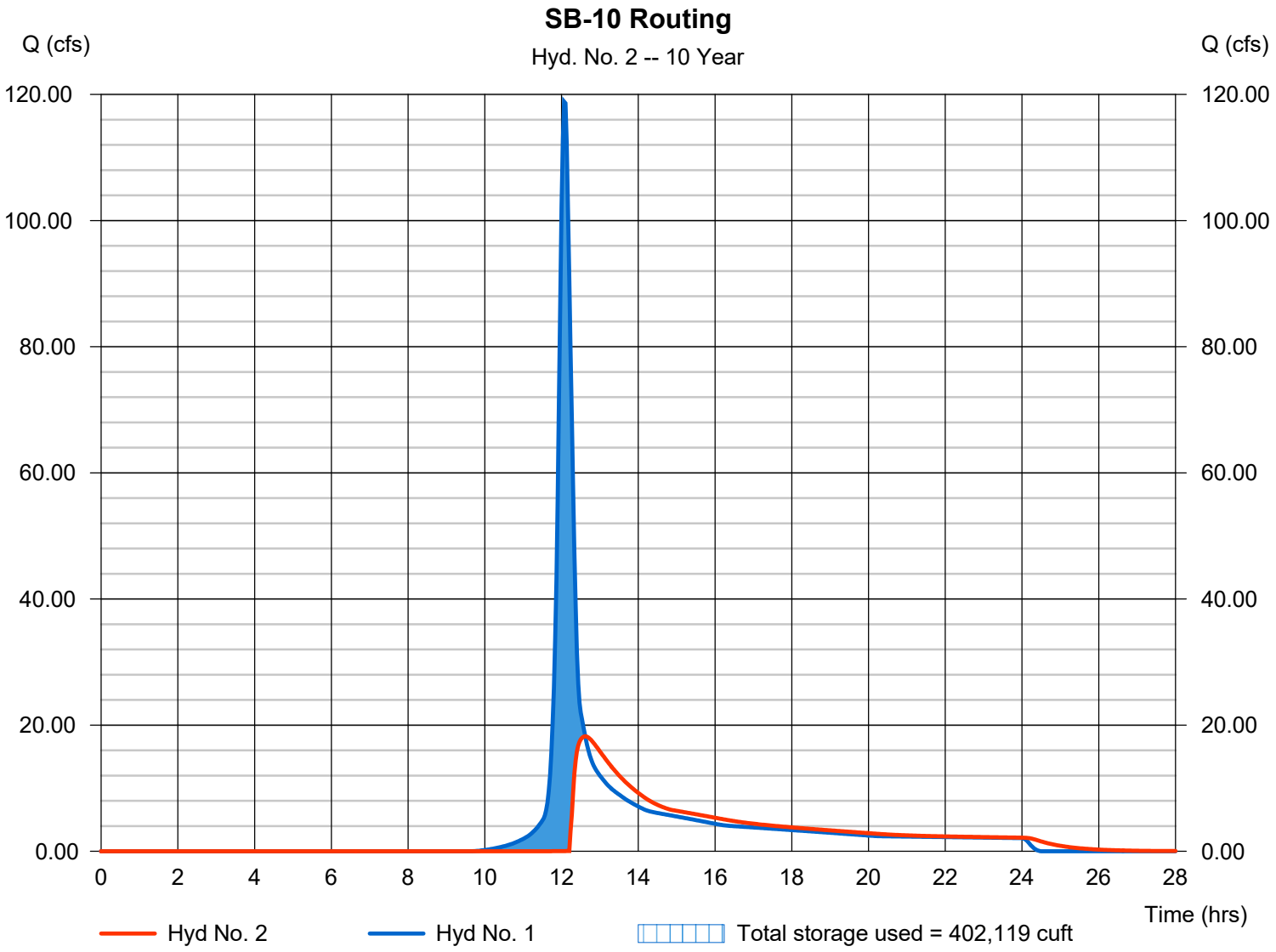
Hydrograph Report

Hyd. No. 2

SB-10 Routing

Hydrograph type	=	Reservoir	Peak discharge	=	18.22 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.60 hrs
Time interval	=	2 min	Hyd. volume	=	243,441 cuft
Inflow hyd. No.	=	1 - DA-10	Max. Elevation	=	342.39 ft
Reservoir name	=	Basin 10	Max. Storage	=	402,119 cuft

Storage Indication method used. Wet pond routing start elevation = 340.00 ft.



ATTACHMENT 4
FLOODING CALCULATIONS

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-1 PREDEVELOPMENT DISCHARGE CHANNEL, 10-YR STORM

User-defined

Invert Elev (ft)	= 315.00
Slope (%)	= 4.01
N-Value	= 0.040

Calculations

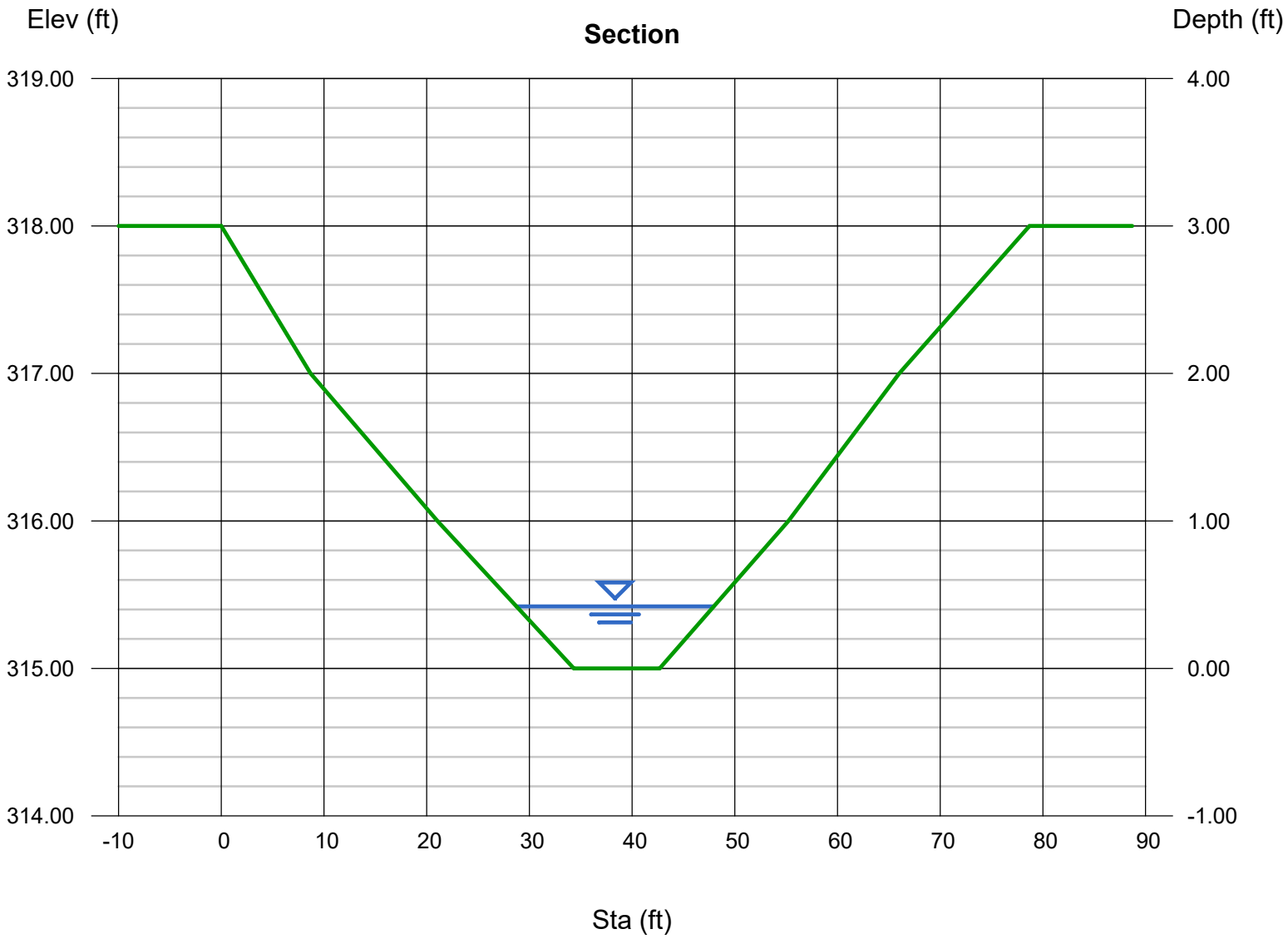
Compute by:	Known Q
Known Q (cfs)	= 19.31

Highlighted

Depth (ft)	= 0.42
Q (cfs)	= 19.31
Area (sqft)	= 5.79
Velocity (ft/s)	= 3.34
Wetted Perim (ft)	= 19.23
Crit Depth, Yc (ft)	= 0.44
Top Width (ft)	= 19.20
EGL (ft)	= 0.59

(Sta, El, n)-(Sta, El, n)...

(0.00, 318.00)-(8.69, 317.00, 0.040)-(21.05, 316.00, 0.040)-(34.32, 315.00, 0.040)-(42.68, 315.00, 0.040)-(55.22, 316.00, 0.040)-(66.02, 317.00, 0.040)-(78.70, 318.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-2 PREDEVELOPMENT 10-YEAR

User-defined

Invert Elev (ft)	= 309.89
Slope (%)	= 3.07
N-Value	= 0.040

Calculations

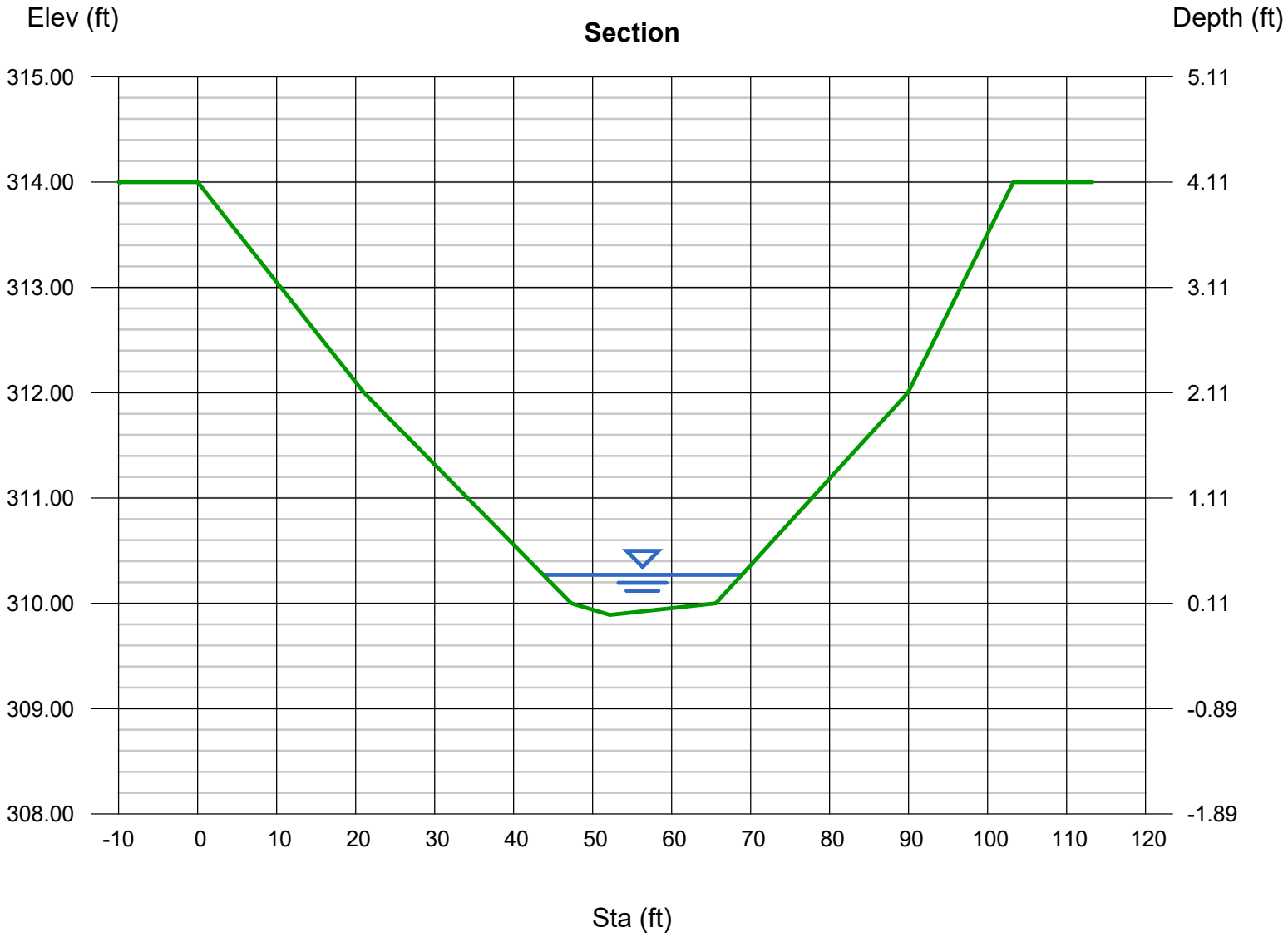
Compute by:	Known Q
Known Q (cfs)	= 18.57

Highlighted

Depth (ft)	= 0.38
Q (cfs)	= 18.57
Area (sqft)	= 6.87
Velocity (ft/s)	= 2.70
Wetted Perim (ft)	= 25.14
Crit Depth, Yc (ft)	= 0.37
Top Width (ft)	= 25.11
EGL (ft)	= 0.49

(Sta, El, n)-(Sta, El, n)...

(0.00, 314.00)-(21.07, 312.00, 0.040)-(47.31, 310.00, 0.040)-(52.18, 309.89, 0.040)-(65.60, 310.00, 0.040)-(89.91, 312.00, 0.040)-(103.27, 314.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-3 PREDEVELOPMENT DISCHARGE CHANNEL, 10-YR STORM

User-defined

Invert Elev (ft)	= 310.68
Slope (%)	= 8.14
N-Value	= 0.040

Calculations

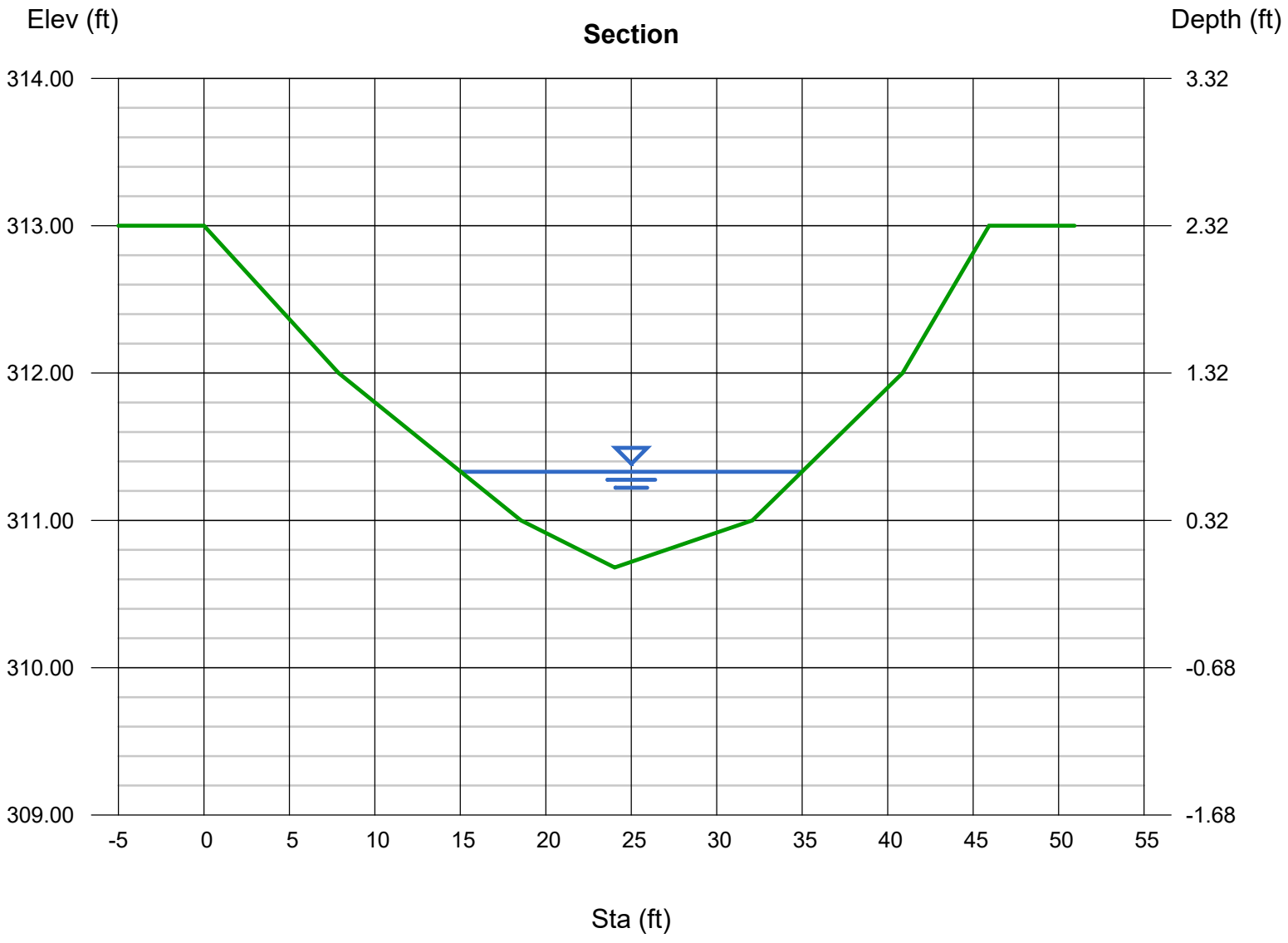
Compute by:	Known Q
Known Q (cfs)	= 42.27

Highlighted

Depth (ft)	= 0.65
Q (cfs)	= 42.27
Area (sqft)	= 7.69
Velocity (ft/s)	= 5.50
Wetted Perim (ft)	= 20.00
Crit Depth, Yc (ft)	= 0.80
Top Width (ft)	= 19.95
EGL (ft)	= 1.12

(Sta, El, n)-(Sta, El, n)...

(0.00, 313.00)-(7.88, 312.00, 0.040)-(18.55, 311.00, 0.040)-(24.03, 310.68, 0.040)-(32.08, 311.00, 0.040)-(40.87, 312.00, 0.040)-(45.93, 313.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-4 PREDEVELOPMENT DISCHARGE CHANNEL, 10-YR STORM

User-defined

Invert Elev (ft)	= 269.40
Slope (%)	= 1.85
N-Value	= 0.040

Calculations

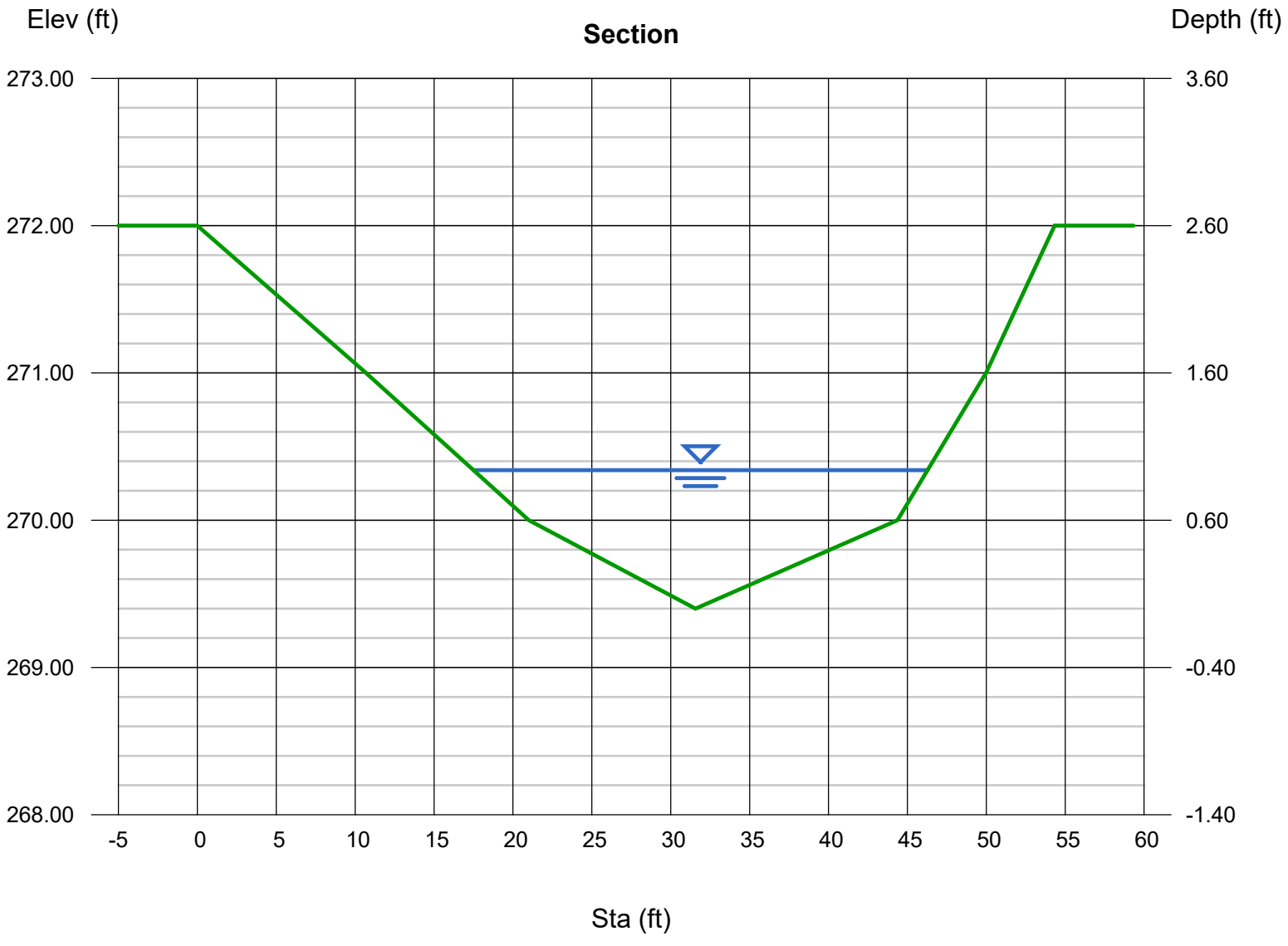
Compute by:	Known Q
Known Q (cfs)	= 53.07

Highlighted

Depth (ft)	= 0.94
Q (cfs)	= 53.07
Area (sqft)	= 15.87
Velocity (ft/s)	= 3.34
Wetted Perim (ft)	= 28.86
Crit Depth, Yc (ft)	= 0.86
Top Width (ft)	= 28.78
EGL (ft)	= 1.11

(Sta, El, n)-(Sta, El, n)...

(0.00, 272.00)-(10.68, 271.00, 0.040)-(21.01, 270.00, 0.040)-(31.57, 269.40, 0.040)-(44.37, 270.00, 0.040)-(49.98, 271.00, 0.040)-(54.33, 272.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-5 PREDEVELOPMENT DISCHARGE CHANNEL, 10-YR STORM

User-defined

Invert Elev (ft)	= 272.90
Slope (%)	= 2.51
N-Value	= 0.040

Calculations

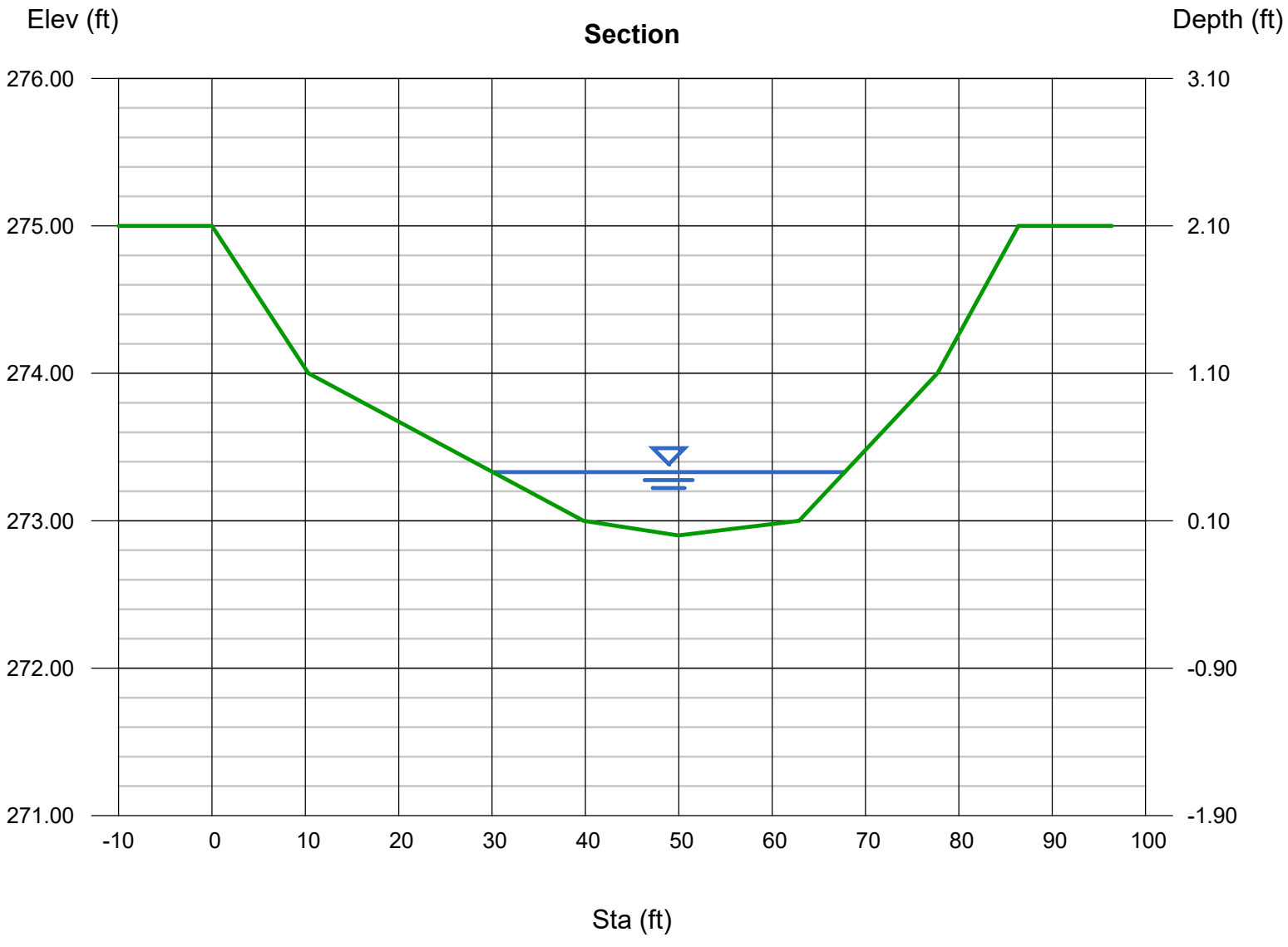
Compute by:	Known Q
Known Q (cfs)	= 28.60

Highlighted

Depth (ft)	= 0.43
Q (cfs)	= 28.60
Area (sqft)	= 11.19
Velocity (ft/s)	= 2.56
Wetted Perim (ft)	= 37.72
Crit Depth, Yc (ft)	= 0.39
Top Width (ft)	= 37.71
EGL (ft)	= 0.53

(Sta, El, n)-(Sta, El, n)...

(0.00, 275.00)-(10.33, 274.00, 0.040)-(39.80, 273.00, 0.040)-(49.94, 272.90, 0.040)-(62.89, 273.00, 0.040)-(77.71, 274.00, 0.040)-(86.39, 275.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-6 PREDEVELOPMENT 10-YEAR

User-defined

Invert Elev (ft)	= 281.19
Slope (%)	= 4.02
N-Value	= 0.040

Calculations

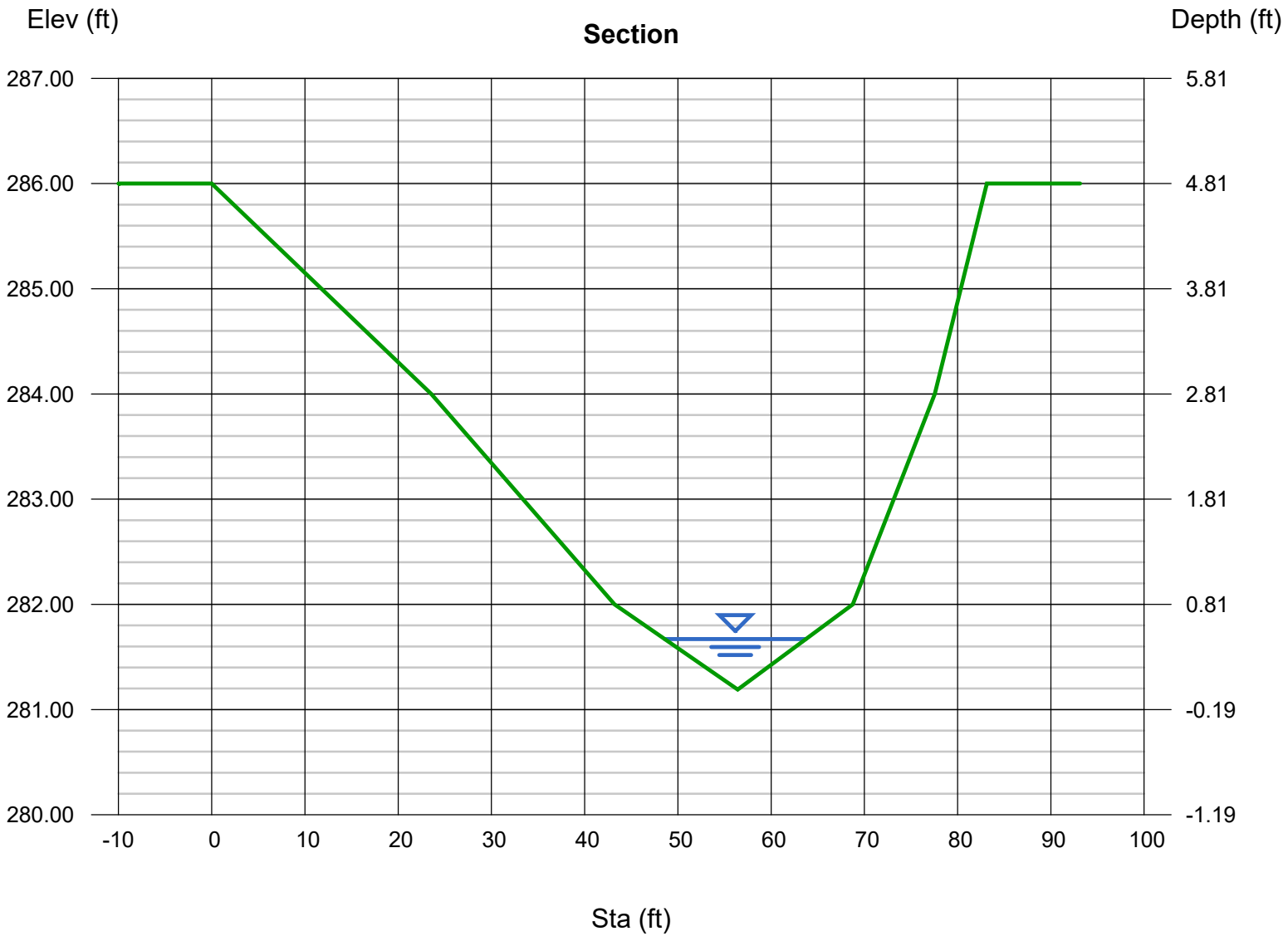
Compute by:	Known Q
Known Q (cfs)	= 10.15

Highlighted

Depth (ft)	= 0.48
Q (cfs)	= 10.15
Area (sqft)	= 3.63
Velocity (ft/s)	= 2.79
Wetted Perim (ft)	= 15.17
Crit Depth, Yc (ft)	= 0.49
Top Width (ft)	= 15.14
EGL (ft)	= 0.60

(Sta, El, n)-(Sta, El, n)...

(0.00, 286.00)-(23.55, 284.00, 0.040)-(43.20, 282.00, 0.040)-(56.41, 281.19, 0.040)-(68.75, 282.00, 0.040)-(77.55, 284.00, 0.040)-(83.14, 286.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-7 PREDEVELOPMENT DISCHARGE CHANNEL, 10-YR STORM

User-defined

Invert Elev (ft)	= 259.70
Slope (%)	= 8.25
N-Value	= 0.040

Calculations

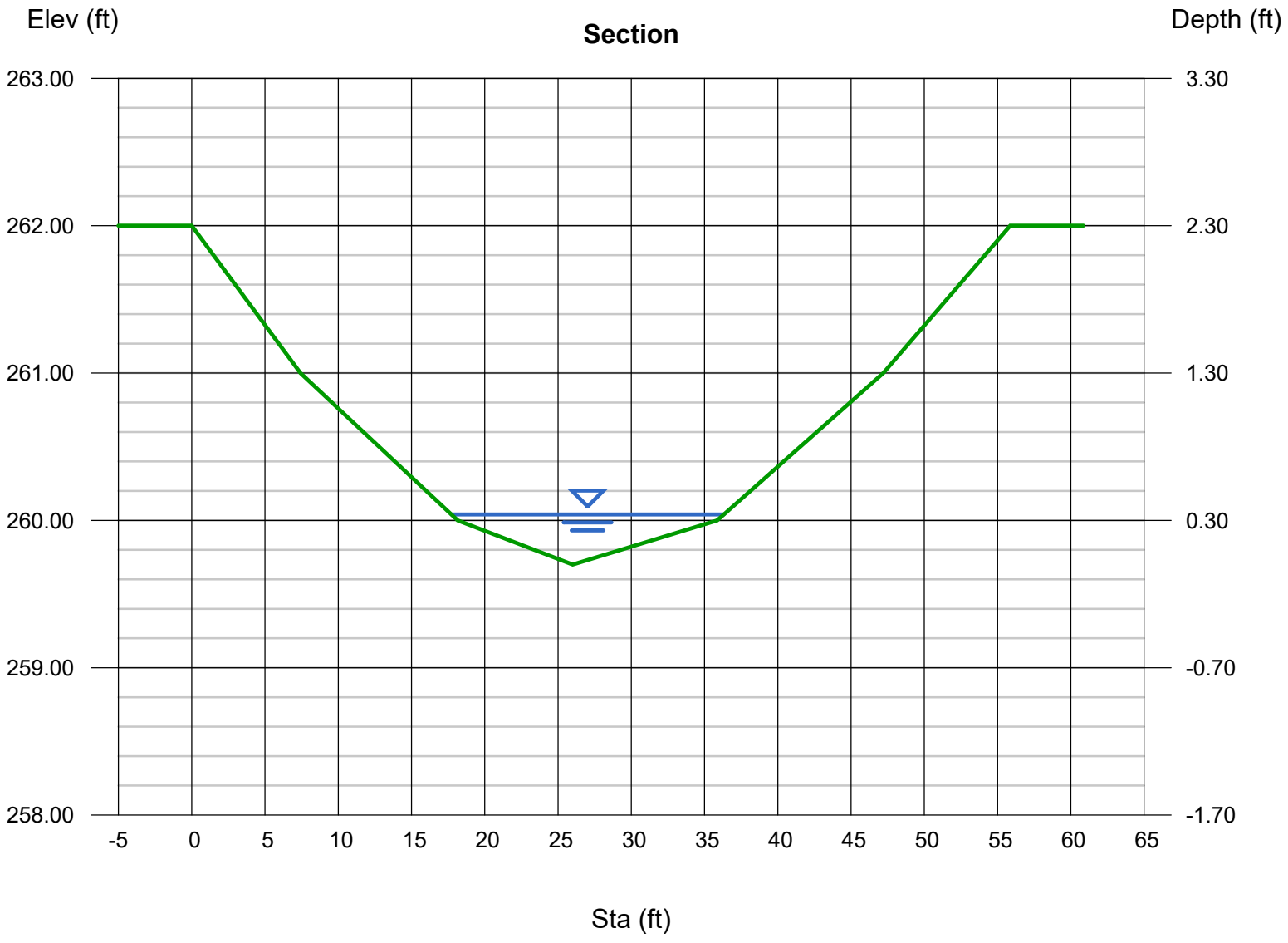
Compute by:	Known Q
Known Q (cfs)	= 11.11

Highlighted

Depth (ft)	= 0.34
Q (cfs)	= 11.11
Area (sqft)	= 3.38
Velocity (ft/s)	= 3.29
Wetted Perim (ft)	= 18.60
Crit Depth, Yc (ft)	= 0.39
Top Width (ft)	= 18.58
EGL (ft)	= 0.51

(Sta, El, n)-(Sta, El, n)...

(0.00, 262.00)-(7.42, 261.00, 0.040)-(18.16, 260.00, 0.040)-(26.00, 259.70, 0.040)-(35.86, 260.00, 0.040)-(47.20, 261.00, 0.040)-(55.86, 262.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-8 PREDEVELOPMENT 10-YEAR

User-defined

Invert Elev (ft)	= 267.30
Slope (%)	= 6.41
N-Value	= 0.040

Calculations

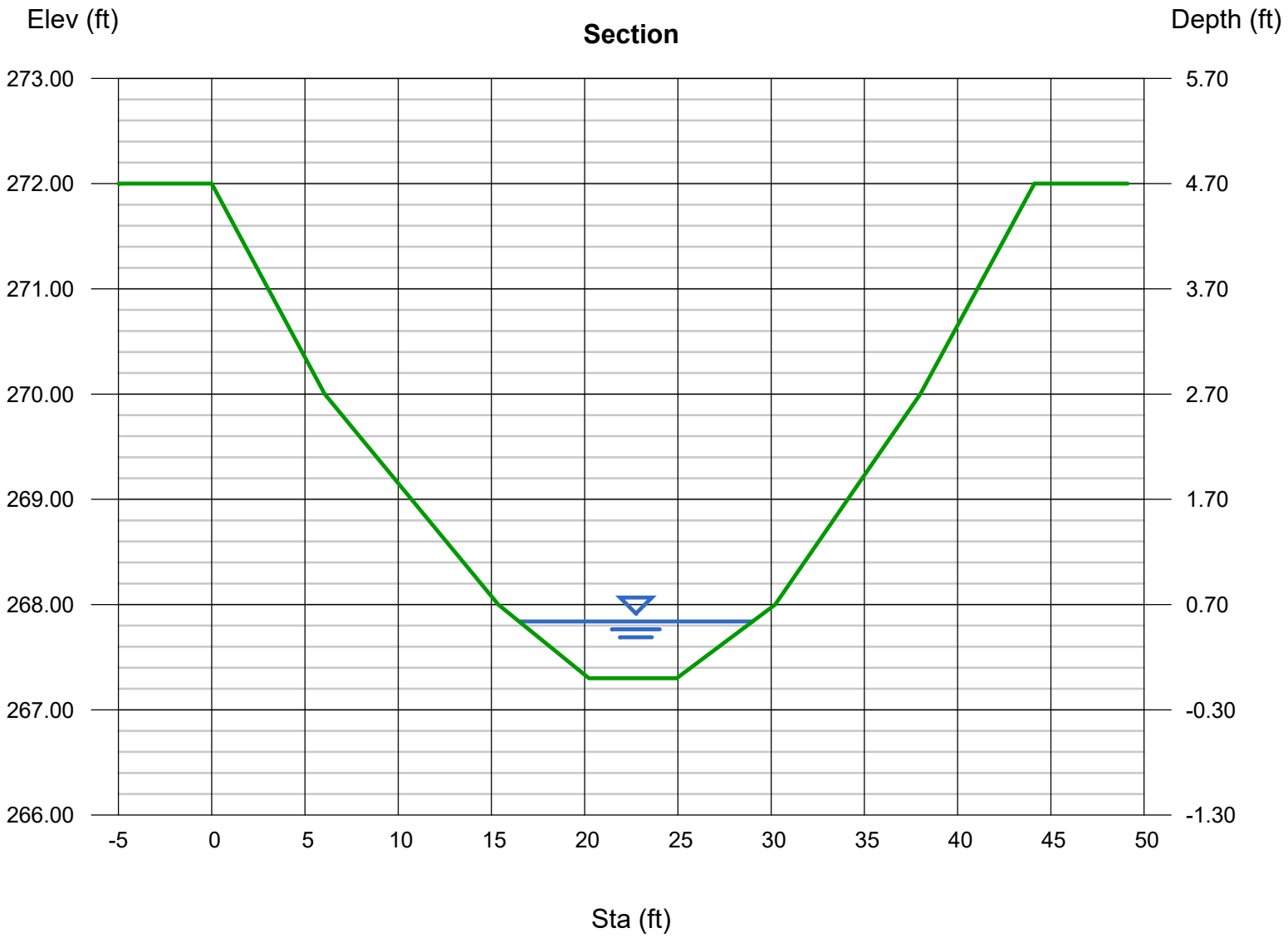
Compute by:	Known Q
Known Q (cfs)	= 21.76

Highlighted

Depth (ft)	= 0.54
Q (cfs)	= 21.76
Area (sqft)	= 4.66
Velocity (ft/s)	= 4.67
Wetted Perim (ft)	= 12.61
Crit Depth, Yc (ft)	= 0.64
Top Width (ft)	= 12.53
EGL (ft)	= 0.88

(Sta, El, n)-(Sta, El, n)...

(0.00, 272.00)-(6.06, 270.00, 0.040)-(15.37, 268.00, 0.040)-(20.23, 267.30, 0.040)-(24.94, 267.30, 0.040)-(30.22, 268.00, 0.040)-(38.00, 270.00, 0.040)-(44.12, 272.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-9 PREDEVELOPMENT DISCHARGE CHANNEL, 10-YR STORM

User-defined

Invert Elev (ft)	= 292.70
Slope (%)	= 1.49
N-Value	= 0.040

Calculations

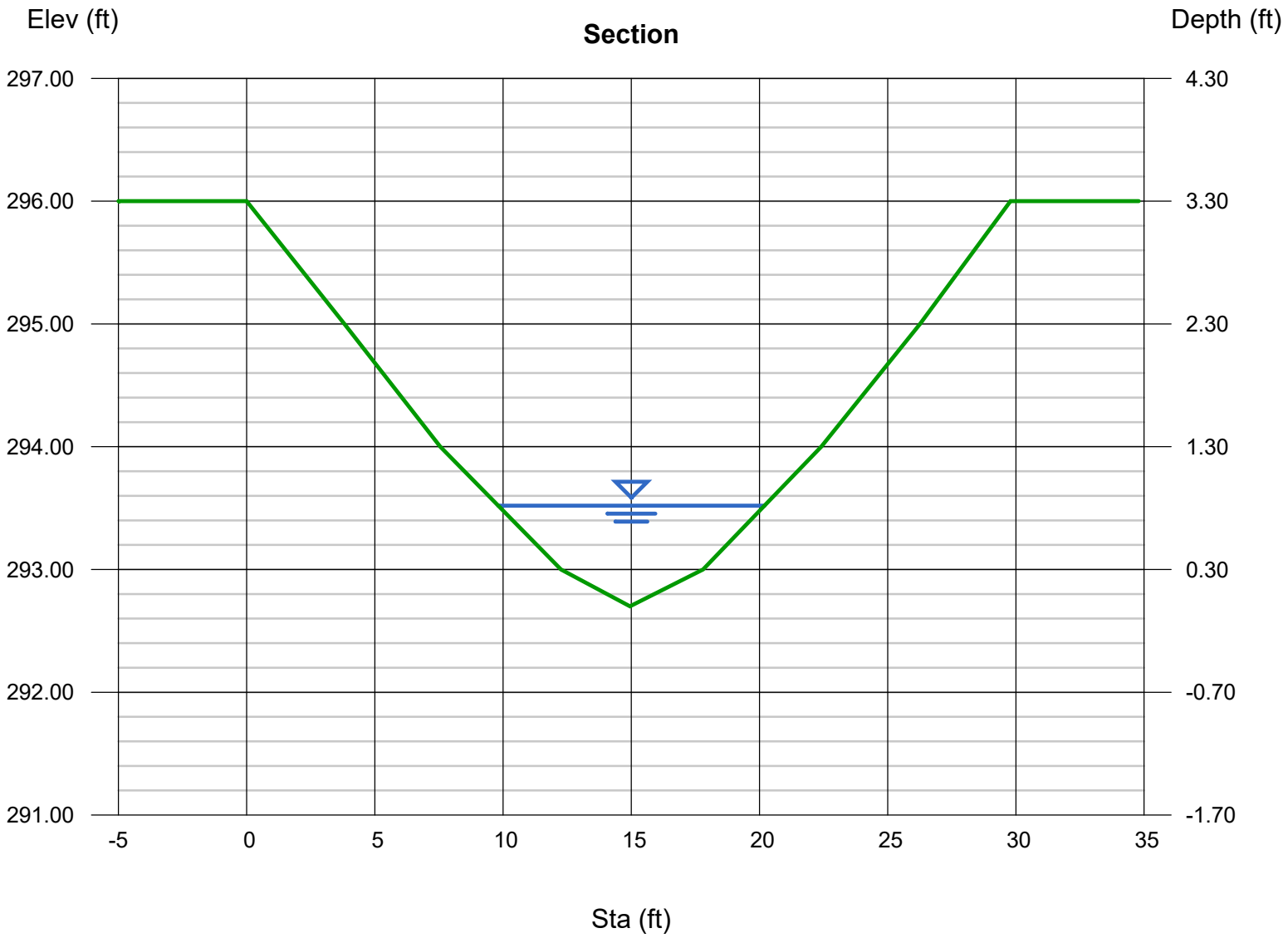
Compute by:	Known Q
Known Q (cfs)	= 13.43

Highlighted

Depth (ft)	= 0.82
Q (cfs)	= 13.43
Area (sqft)	= 4.97
Velocity (ft/s)	= 2.70
Wetted Perim (ft)	= 10.53
Crit Depth, Yc (ft)	= 0.70
Top Width (ft)	= 10.39
EGL (ft)	= 0.93

(Sta, El, n)-(Sta, El, n)...

(0.00, 296.00)-(3.81, 295.00, 0.040)-(7.55, 294.00, 0.040)-(12.26, 293.00, 0.040)-(14.95, 292.70, 0.040)-(17.80, 293.00, 0.040)-(22.41, 294.00, 0.040)-(26.26, 295.00, 0.040)-(29.79, 296.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Mar 12 2020

DA-10 PREDEVELOPMENT 10-YEAR

User-defined

Invert Elev (ft)	= 331.50
Slope (%)	= 2.17
N-Value	= 0.040

Calculations

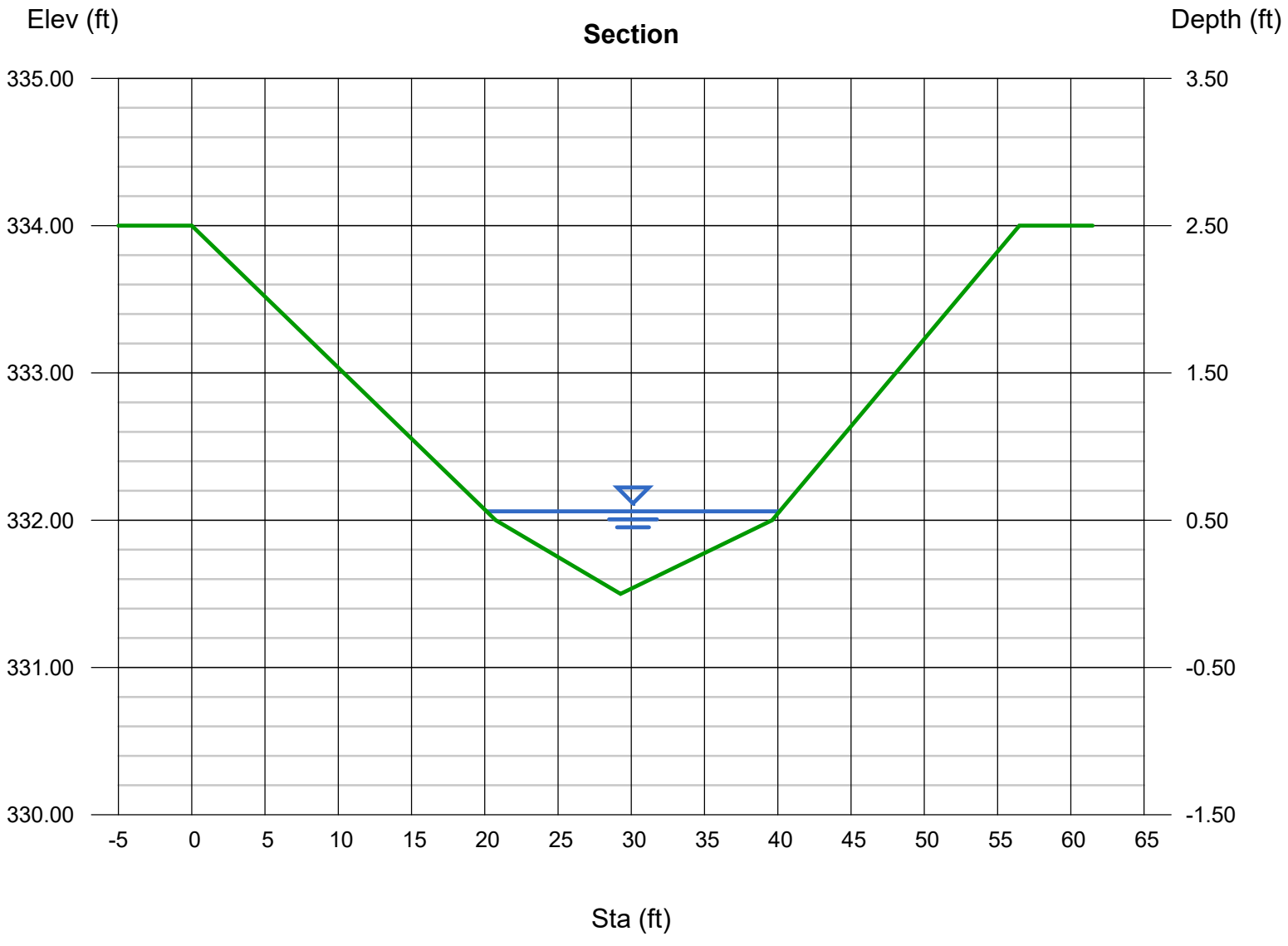
Compute by:	Known Q
Known Q (cfs)	= 13.76

Highlighted

Depth (ft)	= 0.56
Q (cfs)	= 13.76
Area (sqft)	= 5.88
Velocity (ft/s)	= 2.34
Wetted Perim (ft)	= 20.02
Crit Depth, Yc (ft)	= 0.51
Top Width (ft)	= 19.99
EGL (ft)	= 0.65

(Sta, El, n)-(Sta, El, n)...

(0.00, 334.00)-(20.75, 332.00, 0.040)-(29.27, 331.50, 0.040)-(39.61, 332.00, 0.040)-(56.49, 334.00, 0.040)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Mar 11 2020

DA-10 POSTDEVELOPMENT 10-YEAR

User-defined

Invert Elev (ft)	= 331.50
Slope (%)	= 2.17
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 18.22

Highlighted

Depth (ft)	= 0.62
Q (cfs)	= 18.22
Area (sqft)	= 7.11
Velocity (ft/s)	= 2.56
Wetted Perim (ft)	= 21.16
Crit Depth, Yc (ft)	= 0.57
Top Width (ft)	= 21.12
EGL (ft)	= 0.72

(Sta, El, n)-(Sta, El, n)...

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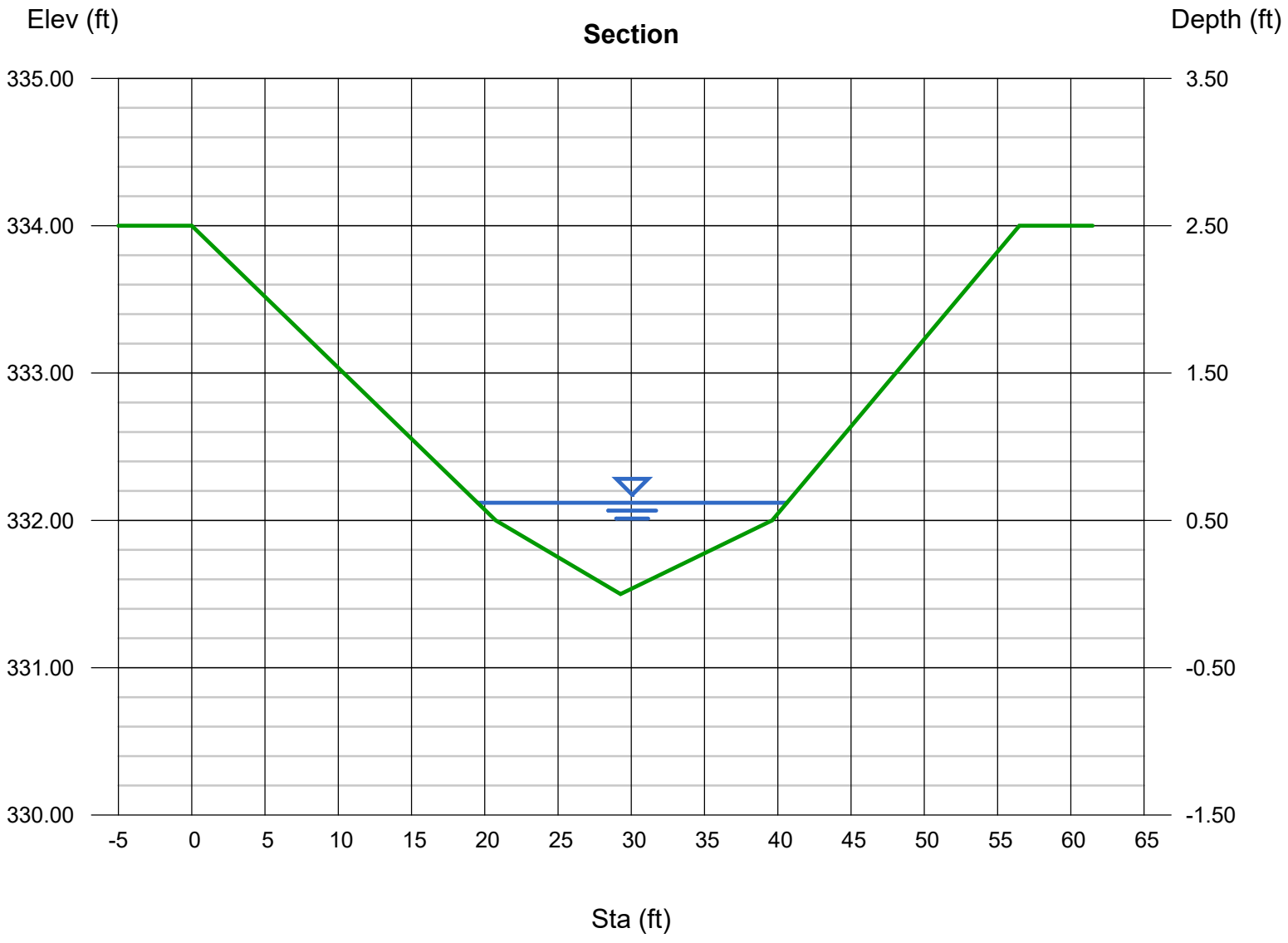

ATTACHMENT 9

GREEN RIDGE RECYCLING AND DISPOSAL FACILITY - CONCEPTUAL DESIGN FOR JPA PERMITTING RESPONSE TO DEQ AND ACOE

DATED APRIL 22, 2021

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

CONCEPTUAL DESIGN FOR JPA PERMITTING
RESPONSE TO DEQ AND ACOE

* * *

GREEN RIDGE RECYCLING & DISPOSAL FACILITY

* * *

CUMBERLAND COUNTY, VIRGINIA

SITE SUMMARY

OWNER/DEVELOPER: GREEN RIDGE RECYCLING & DISPOSAL
411 ROUTE 146
HALFMOON, NY 12065

CONTACT: JERRY CIFOR
12230 DEER GROVE ROAD
MIDLOTHIAN, VIRGINIA 23112
TELEPHONE NO: 802-379-1575

ENGINEER: DRAPER ADEN ASSOCIATES
1030 WILMER AVE, SUITE 100
RICHMOND, VIRGINIA 23227

CONTACT: LYNN KLAPPICH
TELEPHONE NO. 540-552-0444
EMAIL: lklappich@daa.com

PARCEL NUMBER: 38-A-7, 44-A-13, 44-A-14, 44-A-21, 44-A-22, 44-A-36, 44-A-33, 45-1-40, 45-1-41, 45-2-2-A, 45-2-2-B, 45-A-1, 45-A-7

LOCATION: THE SITE IS IN CLINTON, VIRGINIA, NORTH OF U.S. ROUTE 60 (ANDERSON HIGHWAY), AND LOOSELY BOUNDED BY ROUTE 654 (PINEGROVE ROAD) AND ROUTE 685 (MILLER LANE).

PRESENT ZONING: M2, A2

PROJECT SUMMARY:
EXISTING USE: TIMBER FARMS
PROPOSED USE: SANITARY LANDFILL
ACREAGE: 1,178 ACRES

FLOOD ZONE X & A FIRM COMMUNITY-PANEL NUMBER: 5100430125B DATED JUNE 16, 2009
5100430150B DATED JUNE 16, 2009
51145C0100B DATED FEBRUARY 6, 2008

LAND DISTURBANCE: 404 ACRES

WETLANDS ON-SITE: YES
WETLAND PERMITS REQ'D: YES
VSMP PERMIT: YES
RPA ON-SITE: NO
RMA ON-SITE: NO

NOTES:
1. THIS MAPPING PROJECT, L18-10560, WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF, ROBERT H. TUCK FROM AN ACTUAL AIRBORNE SURVEY MADE UNDER MY SUPERVISION; THAT THE IMAGERY AND/OR ORIGINAL DATA WAS OBTAINED ON 05-02-18; AND THAT THIS PLAT, MAP, OR DIGITAL GEOSPATIAL DATA INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

2. PARCEL LINES SHOWN HEREON ARE PER BOUNDARY SURVEYS BY HIGHMARK ENGINEERING DATED MAY 24, 2018, MARCH 4, 2019, APRIL 17, 2019 AND PER BOUNDARY SURVEY BY DRAPER ADEN ASSOCIATES DATED MARCH 29, 2019 AND COMPILED BOUNDARY EXHIBIT BY DRAPER ADEN ASSOCIATES DATED NOVEMBER 6, 2019.

3. WETLANDS INFORMATION PROVIDED BY A SURVEY PERFORMED BY KOONTZ BRYANT JOHNSON WILLIAMS GROUP, DATED AUGUST 22, 2018, REVISED MAY 10, 2019..

VICINITY MAP

1" = 2000'

PROJECT DESCRIPTION

THE PROJECT INCLUDES THE PERMITTING, CONSTRUCTION AND OPERATION OF A 238 ACRE SANITARY LANDFILL WITH A LIFE EXPECTANCY OF 25 – 30 YEARS. IN SUPPORT OF THE SANITARY LANDFILL, THE PROJECT WILL REQUIRE THE CONSTRUCTION OF AN ENTRANCE OFF OF ROUTE 60, CONVENIENCE CENTER FOR PUBLIC USE, ACCESS ROAD TO THE SITE, SCALES AND SCALE HOUSE, RELOCATION OF MILLER LANE AND PINE GROVE ROAD, INTERNAL ACCESS ROADS, BORROW AREAS IN SUPPORT OF THE OPERATIONS, STORMWATER MANAGEMENT BMPS AND STRUCTURES, OFFICE AND MAINTENANCE FACILITIES, PARKING AND OTHER ANCILLARY FACILITIES SUCH AS A LEACHATE TANK FARM AS MAY BE NEEDED FOR OPERATIONS AND AS REQUIRED BY THE FINAL LANDFILL PERMIT. FACILITY IS UNDERGOING PERMITTING WITH THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY AND OTHER AGENCIES. THE TOTAL AREA OF LAND DISTURBANCE FOR THIS PROJECT IS 404 ACRES.

* * * * * * *

MARCH 1, 2021

* * * * * * *

DAA PROJECT #18020117-090102

NOTE: CONTRACTOR TO CONTACT MISS UTILITY (811) IN ADVANCE OF PLANNED WORK. ADVANCE TIME PERIOD SHALL BE IN ACCORDANCE WITH CURRENT MISS UTILITY GUIDELINES (www.missutilityofvirginia.com).

Sheet List Table

Sheet Number	Sheet Title
1.0	COVER SHEET
2.0	NOTES
2.1	NOTES
3.0	OVERALL SHEET LAYOUT PLAN
4.0	LANDFILL DISPOSAL UNIT
5.0	BORROW AREA 1 GRADING PLAN
5.1	BORROW AREA 2 GRADING PLAN
5.2	BORROW AREA 3 GRADING PLAN
6.0	ENTRANCE ROAD ESC PLAN
6.1	ENTRANCE ROAD ESC PLAN
6.2	ENTRANCE ROAD ESC PLAN
6.3	ENTRANCE ROAD ESC PLAN
6.0A	ENTRANCE ROAD PLAN & PROFILE
6.1A	ENTRANCE ROAD PLAN & PROFILE
6.2A	ENTRANCE ROAD PLAN & PROFILE
6.3A	ENTRANCE ROAD PLAN & PROFILE
7.0	SECONDARY ROAD ESC PLAN
7.1	SECONDARY ROAD ESC PLAN
7.2	SECONDARY ROAD ESC PLAN
7.0A	SECONDARY ROAD PLAN & PROFILE
7.1A	SECONDARY ROAD PLAN & PROFILE
7.2A	SECONDARY ROAD PLAN & PROFILE
8.0	HAUL ROAD ESC PLAN
8.1	HAUL ROAD ESC PLAN
8.2	HAUL ROAD ESC PLAN
8.0A	HAUL ROAD PLAN & PROFILE
8.1A	HAUL ROAD PLAN & PROFILE
8.2A	HAUL ROAD PLAN & PROFILE
9.0	CULVERT CROSS SECTIONS
10.0	CULVERT DRAINAGE AREA MAP
11.0	CULVERT CALCULATIONS
11.1	CULVERT CALCULATIONS
11.2	CULVERT CALCULATIONS
12.0	STREAM PROFILES & CROSS SECTIONS
12.1	STREAM PROFILES & CROSS SECTIONS

DRAPER ADEN ASSOCIATES REVIEW

THESE PLANS HAVE BEEN SUBJECTED TO TECHNICAL AND QUALITY REVIEWS BY:

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PROJECT DESIGNER

GLENN W. CUSTIS, P.E. — 03/01/2021
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COVER SHEET
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY: EEH
DRAWN BY: EEH
CHECKED BY: GWC
SCALE: 1" = 1,000'
DATE: APRIL 22, 2021
PROJECT NUMBER: 18020117-090102

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FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

GENERAL NOTES

1. DIMENSIONS AND RADII ARE TO FACE OF CURB, WHERE APPLICABLE, UNLESS OTHERWISE INDICATED.
2. DIMENSIONS AT BUILDING ARE TO OUTSIDE FACE, UNLESS OTHERWISE INDICATED.
3. THE CONTRACTOR SHALL SECURE ALL NECESSARY PERMITS FOR THIS PROJECT FROM THE COUNTY OF GOOCHLAND OR STATE AGENCIES.
4. ANY PERMITS WHICH MUST BE OBTAINED SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND AT HIS EXPENSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.
5. ALL WATER AND SEWER CONSTRUCTION AND MATERIALS SHALL CONFORM WITH THE LATEST STANDARDS AND SPECIFICATIONS OF THE COUNTY OF GOOCHLAND. (REFERENCE DEPARTMENT OF PUBLIC UTILITIES COUNTY OF GOOCHLAND, VIRGINIA STANDARDS FOR DETAILS.)
6. WHERE PAVEMENT IS BEING REMOVED, THE CONTRACTOR SHALL REMOVE AGGREGATE BASE MATERIAL TO SUB-GRADE.
7. DAMAGE TO UTILITIES (INCLUDING UNDERGROUND) OR PROPERTY OF OTHERS BY CONTRACTOR DURING CONSTRUCTION SHALL BE REPAIRED TO PRE-CONSTRUCTION CONDITIONS BY CONTRACTOR AT NO COST TO OWNER.
8. EXISTING PAVEMENT AND OTHER SURFACES DISTURBED BY CONTRACTOR (WHICH ARE NOT TO BE REMOVED) SHALL BE REPAIRED TO LIKE-NEW CONDITION.
9. THE CONTRACTOR IS REQUIRED TO MAINTAIN ALL DITCHES, PIPES, AND OTHER DRAINAGE STRUCTURES FREE FROM OBSTRUCTION UNTIL WORK IS ACCEPTED BY THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES CAUSED BY FAILURE TO MAINTAIN DRAINAGE STRUCTURES IN OPERABLE CONDITION.
10. THE OWNER SHALL HAVE A SET OF APPROVED PLANS AVAILABLE AT THE SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED. A DESIGNATED RESPONSIBLE EMPLOYEE SHALL BE AVAILABLE FOR CONTACT BY COUNTY OF GOOCHLAND INSPECTORS.
11. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER REGARDING THE REQUIREMENTS FOR AND LIMITS OF UNDERGROUND ELECTRICAL SERVICE AND GAS SERVICE.
12. THE CONTRACTOR SHALL COORDINATE THE LOCATION OF NEW UNDERGROUND TELEPHONE SERVICE WITH THE TELEPHONE UTILITY AND THE OWNER'S REQUIREMENTS.
13. ALL PROPOSED UTILITIES ARE TO BE INSTALLED UNDERGROUND INCLUDING ELECTRIC, TELEPHONE, AND CATV.
14. ALL UNDERGROUND UTILITIES (WATER, SANITARY SEWER, ELECTRICITY, TELEPHONE, ETC.) SHALL BE INSTALLED AND TESTED SATISFACTORILY PRIOR TO COMMENCING ANY PAVING OPERATIONS WHERE SUCH UTILITIES ARE WITHIN THE LIMITS OF PAVEMENT.
15. ALL GROUND COVER AND LANDSCAPING SHALL BE PROPERLY MAINTAINED IN A HEALTHY CONDITION AT ALL TIMES. DEAD PLANT MATERIALS SHALL BE REMOVED IN A REASONABLE TIME AND REPLACED DURING THE NORMAL PLANTING SEASON.
16. FIRE LANE DESIGNATION AND MARKING TO BE DETERMINED PRIOR TO ISSUANCE OF THE CERTIFICATE OF OCCUPANCY.
17. UNLESS OTHERWISE NOTED, ALL CONCRETE PIPE SHALL BE REINFORCED CONCRETE PIPE, CLASS III.
18. ALL EXCAVATION FOR UNDERGROUND PIPE INSTALLATION MUST COMPLY WITH OSHA STANDARDS FOR THE CONSTRUCTION INDUSTRY (29 CFR PART 1926).
19. VERIFY THE PROPOSED LAYOUT WITH ITS RELATIONSHIP TO THE EXISTING SITE SURVEY. ALSO VERIFY ALL DIMENSIONS, SITE CONDITIONS, AND MATERIAL SPECIFICATIONS AND NOTIFY THE OWNER AND ENGINEER OF ANY ERRORS, OMISSIONS, OR DISCREPANCIES BEFORE COMMENCING OR PROCEEDING WITH WORK.
20. DEVIATIONS FROM, OR CHANGES TO THESE PLANS WILL NOT BE ALLOWED, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
21. MAKE EXPLORATORY EXCAVATIONS AND LOCATE EXISTING UTILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO THE PLANS IF NECESSARY. THE EXISTENCE AND/OR LOCATION OF UTILITIES SHOWN ON THESE PLANS MAY BE ONLY APPROXIMATELY CORRECT. TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN HEREON AND ANY OTHER EXISTING UTILITIES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. REPAIR AT YOUR OWN EXPENSE, ANY EXISTING UTILITIES DAMAGED DURING CONSTRUCTION. IF A UTILITY IS DAMAGED DURING CONSTRUCTION, STOP WORK IMMEDIATELY AND NOTIFY THE ENGINEER.
22. PROPERLY SECURE THE CONSTRUCTION AREA AT ALL TIMES AGAINST UNAUTHORIZED ENTRY AND ADEQUATELY PROTECT EQUIPMENT, MATERIALS, AND COMPLETED WORK FROM THEFT AND VANDALISM. THE OWNER IS NOT RESPONSIBLE FOR THE LOSS OF ANY MATERIAL STORED AT THE SITE.
23. ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND SHALL DEFEND, INDEMNIFY, AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL AND ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF ANY WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM "THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER."
24. ALL TURF AREAS THAT ARE IMPACTED OR DISTURBED BY VEHICLES, EQUIPMENT, OR ACTIVITY SHALL BE REPAIRED, REGRADED, AND RESEEDED TO THE SATISFACTION OF THE OWNER.
25. PERFORM ALL WORK USING DIMENSIONS SHOWN ON THESE PLANS. DO NOT USE SCALES, RULERS, DIVIDERS, MAP WHEELS OR OTHER MEASURING DEVICES TO DETERMINE SPATIAL RELATIONSHIPS ON THESE DRAWINGS.
26. ALL UNSUITABLE MATERIAL SHALL BE REMOVED FROM THE CONSTRUCTION LIMITS OF PAVED AREAS.
27. NO LANDSCAPING OF ANY TYPE SHALL BE PLACED WITHIN A THREE FOOT RADIUS OF ANY FIRE HYDRANT, FIRE PUMP TEST HEADER, FIRE DEPARTMENT SPRINKLER SYSTEM CONNECTION, FIRE DEPARTMENT STANDPIPE CONNECTION OR FIRE SUPPRESSION CONTROL VALVE. LANDSCAPING IN THE AREA OF FIRE HYDRANTS, FIRE PUMP TEST HEADERS, FIRE DEPARTMENT SPRINKLER SYSTEM CONNECTIONS OR FIRE DEPARTMENT STANDPIPE CONNECTIONS SHALL BE OF THE TYPE THAT WILL NOT ENCROACH ON THE REQUIRED THREE FOOT RADIUS ON MATURITY OF THE LANDSCAPING.
28. AN APPROVED KEY BOX SHALL BE PROVIDED FOR THE PROPOSED SITE IN ACCORDANCE WITH THE INTERNATIONAL FIRE CODE, SECTION 506.1 THE REQUIRED FORMS AND INSTALLATION INSTRUCTIONS FOR THE KEY BOX CAN BE OBTAINED FROM GOOCHLAND FIRE AND EMS, FIRE AND LIFE SAFETY DIVISION, AT 556-5304.

SITE STORM SEWER

1. ALL STORM SEWER MATERIAL, JOINTS, AND INSTALLATION SHALL COMPLY WITH 2012 INTERNATIONAL PLUMBING CODE.
2. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL CONFORM TO ASTM C14 & C76. ALL RCP SHALL HAVE A CONCRETE JOINT WITH CONFINED O-RING GASKET OF RUBBER OR NEOPRENE CONFORMING TO ASTM C443 OR C1173.

EROSION CONTROL NOTES

1. UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA REGULATIONS VR 625-02-00 EROSION AND SEDIMENT CONTROL REGULATIONS.
2. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING. IF DURING CONSTRUCTION, ADDITIONAL EROSION CONTROL DEVICES ARE FOUND NECESSARY, THEY SHALL BE INSTALLED AS DIRECTED BY THE DEPARTMENT OF COMMUNITY DEVELOPMENT.
3. A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.
4. NO DISTURBED AREA WILL BE DENUDED FOR MORE THAN 30 CALENDAR DAYS.
5. ALL STORM AND SANITARY SEWER LINES NOT IN STREETS ARE TO BE MULCHED AND SEEDED IMMEDIATELY AFTER BACKFILL. NO MORE THAN FIVE HUNDRED (500) FEET ARE TO BE OPEN AT ONE TIME.
6. ELECTRIC POWER, TELEPHONE, AND GAS SUPPLY TRENCHES ARE TO BE COMPACTED, SEEDED AND MULCHED IMMEDIATELY AFTER BACKFILL.
7. ALL TEMPORARY EARTH BERMS, DIVERSIONS, AND SILT DAMS ARE TO BE MULCHED AND SEEDED FOR VEGETATIVE COVER IMMEDIATELY AFTER GRADING. STRAW OR HAY MULCH IS REQUIRED. THE SAME APPLIES TO ALL SOIL STOCKPILES.
8. DURING CONSTRUCTION, ALL STORM SEWER INLETS WILL BE PROTECTED BY SILT TRAPS, MAINTAINED AND MODIFIED AS REQUIRED BY CONSTRUCTION PROGRESS.
9. ANY DISTURBED AREA NOT PAVED, SODDED, OR BUILT UPON BY NOVEMBER 1ST, IS TO BE SEEDED ON THAT DATE WITH OATS, ABRUZZI, RYE OR EQUIVALENT AND MULCHED WITH HAY OR STRAW MULCH. MODIFY AS APPLICABLE DEPENDING ON PROPOSED TIME OF CONSTRUCTION.
10. THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
11. DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE.
12. PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE DEPARTMENT OF COMMUNITY DEVELOPMENT.

VDOT GENERAL NOTES

1. ALL MATERIALS AND CONSTRUCTION WITHIN THE PUBLIC RIGHT OF WAY SHALL BE IN ACCORDANCE WITH CURRENT VIRGINIA DEPARTMENT OF TRANSPORTATION'S SPECIFICATIONS, STANDARDS, CURRENT WORK AREA PROTECTION MANUAL, AND ALL APPLICABLE LOCATION AND DESIGN INSTRUCTIONAL AND INFORMATIONAL MEMORANDUMS.
2. LAND USE PERMIT (CE-7) MUST BE OBTAINED FROM THE VIRGINIA DEPARTMENT OF TRANSPORTATION PRIOR TO BEGINNING ANY CONSTRUCTION WITHIN THE EXISTING STATE MAINTAINED RIGHT OF WAY (INCLUDING ACCESS).
3. VDOT IS TO RECEIVE WRITTEN NOTIFICATION 48 HOURS PRIOR TO COMMENCING WITH INITIAL CONSTRUCTION ACTIVITIES.
4. PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR SHALL CONSULT THE ENGINEER AND VERIFY THE APPROVAL OF THE PLANS BY ALL APPLICABLE FEDERAL, STATE AND LOCAL AGENCIES.
5. PRELIMINARY DESIGN OF THE PAVEMENT STRUCTURE FOR ALL SUBDIVISION STREETS SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE PAVEMENT DESIGN GUIDE FOR SUBDIVISION AND SECONDARY ROADS IN VIRGINIA. THE COMPLETED DESIGN WORKSHEET APPENDIX IV SHALL BE INCLUDED WITH THE INITIAL PLAN SUBMITTAL FOR EACH PROPOSED PAVEMENT SECTION UTILIZING THE PREDICTED SOIL SUPPORT VALUE SHOWN IN APPENDIX I OF THE PAVEMENT DESIGN GUIDE.
6. THE CONTRACTOR SHALL VERIFY THE ELEVATIONS OF ALL POINTS OF CONNECTION OR PROPOSED WORK TO EXISTING CURBS, SANITARY LINES, WATER LINES, ETC., PRIOR TO CONSTRUCTION.
7. UPON DISCOVERY OF SOILS THAT ARE UNSUITABLE FOR FOUNDATIONS, SUB-GRADES, OR OTHER ROADWAY CONSTRUCTION PURPOSES, THE CONTRACTOR SHALL IMMEDIATELY CONTACT A GEOTECHNICAL ENGINEER AND VDOT. THESE AREAS SHALL BE EXCAVATED BELOW PLAN GRADE AS DIRECTED BY A GEOTECHNICAL ENGINEER, BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED IN ACCORDANCE WITH CURRENT VDOT SPECIFICATIONS.
8. ALL STORM SEWER DESIGN AND CONSTRUCTION TO BE IN ACCORDANCE WITH VDOT I & I LD-94 (D) 121.13.
9. ALL DRAINAGE STRUCTURES SHALL BE IN ACCORDANCE WITH CURRENT VERSIONS OF LD-97 (D) 121. PIPE WITHIN THE RIGHT OF WAY SHALL BE A MINIMUM CL-III OR GREATER IN ACCORDANCE WITH CURRENT VDOT STANDARDS AND SPECIFICATIONS.
10. ALL PRE-CAST UNITS SHALL BE VDOT APPROVED. CERTIFICATION AND VDOT STAMP WILL BE REQUIRED ON ALL UNITS. SHOP DRAWINGS, GEOTECHNICAL DATA AND SOIL BEARING CAPACITY, AND PLAN VIEW SHALL BE SUBMITTED AS PACKAGE FOR VDOT REVIEW AND APPROVAL.
11. ALL CONCRETE SHALL BE MINIMUM CLASS A3-AE (AIR ENTRAINED 3,000 PSI).
12. ALL ENTRANCES ARE TO BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH CURRENT VDOT STANDARDS. RESIDENTIAL LOT ACCESS SHALL BE PROVIDED PER THE FOLLOWING CRITERIA:
    - ALL DRIVEWAY ENTRANCE CULVERTS ARE TO BE A MINIMUM OF 15" DIAMETER X 20' LONG PIPE AND SHALL CONFORM TO PE-1 PRIVATE ENTRANCE STANDARDS UNLESS OTHERWISE DIRECTED BY THE RESIDENT ENGINEER. NO ENTRANCE CULVERTS ARE TO BE INSTALLED WITHIN FIVE (5) FEET OF A PROPERTY CORNER.
    - VDOT STANDARD CG-9D ENTRANCES SHALL BE INSTALLED IN CURB AND GUTTER NEIGHBORHOODS.

    INSPECTIONS TO BE PERFORMED BY VDOT SHALL BE REQUESTED IN WRITING, 48 HOURS PRIOR TO ENTRANCE INSTALLATION.
13. THE DEVELOPER IS RESPONSIBLE FOR FURNISHING AND INSTALLING ALL SIGNS DEEMED PERTINENT TO THE PROPOSED DEVELOPMENT. THE CONTRACTOR SHALL CONTACT VDOT INSPECTION STAFF TO ESTABLISH LOCATIONS FOR ANY SIGNAGE REQUIREMENTS AS DEEMED NECESSARY BY VDOT. INSTALLATION OF SAID SIGNS SHALL OCCUR AT NO EXPENSE TO THE STATE AND PRIOR TO STATE ACCEPTANCE OF ROADWAY(S).
14. DESIGN CHANGES, SPECIFIED MATERIALS CHANGES AND/OR FIELD CHANGES FROM THE APPROVED PLANS NEED TO BE RE-SUBMITTED TO VDOT PRIOR TO PROCEEDING WITH THE WORK. A LETTER OF EXPLANATION SHALL ACCOMPANY THE REVISED PLANS AND/OR DRAINAGE CALCULATIONS, WHICH MUST BE SUBMITTED, TO VDOT FOR REVIEW AND APPROVAL BY THE RESIDENT ENGINEER.
15. CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF ALL UNDERGROUND UTILITIES SHOWN ON PLANS IN AREAS OF CONSTRUCTION PRIOR TO STARTING WORK. CONTACT ENGINEER IMMEDIATELY IF LOCATION OR ELEVATION IS DIFFERENT FROM THAT SHOWN ON PLAN. IF THERE APPEARS TO BE A CONFLICT, AND/OR UPON DISCOVERY OF ANY UTILITY NOT SHOWN ON THIS PLAN, CALL MISS UTILITY OF CENTRAL VIRGINIA AT 1-800-552-7001 OR 811. THE DEVELOPER SHALL BE RESPONSIBLE FOR THE RELOCATION OF ANY UTILITY WITHIN EXISTING AND/OR PROPOSED RIGHT OF WAY REQUIRED BY THE DEVELOPMENT.
16. ALL STREETLIGHTS SHALL BE LOCATED A MINIMUM OF 9.5' FROM THE EDGE OF PAVEMENT ON CURB AND GUTTER STREETS AND/OR LOCATED A MINIMUM OF 5.5' BEHIND THE DITCH LINE ON OPEN DITCH STREETS.
17. GENERALLY, PAVED ROADSIDE DITCHES ARE TO BE SPECIFIED WHEN VELOCITIES EXCEED CURRENT VDOT DESIGN CRITERIA OR WHEN DITCH SLOPES ARE LESS THAN 0.75%. WHERE DITCH SLOPES EXCEED 5.0%, THE DEVELOPER MAY CHOOSE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES IN AN ATTEMPT TO ACHIEVE CHANNEL STABILIZATION WHILE ACKNOWLEDGING THAT ADDITIONAL PAVED DITCH LININGS MAY BE REQUIRED PRIOR TO ACCEPTANCE OF THE ROADS INTO THE SECONDARY SYSTEM OF STATE HIGHWAYS. PAVED ROADSIDE DITCHES SHALL CONFORM TO VDOT-PG-2A STANDARDS AND SPECIFICATIONS.
18. VDOT AND COUNTY APPROVAL OF CONSTRUCTION PLANS DOES NOT PRECLUDE THE RIGHT TO REQUIRE ADDITIONAL FACILITIES AS DEEMED NECESSARY FOR ACCEPTANCE OF THE ROADS INTO THE VDOT SECONDARY ROAD SYSTEM.
19. VDOT APPROVAL OF SITE PLANS WILL EXPIRE FIVE (5) YEARS FROM THE DATE OF THE INITIAL APPROVAL. VDOT APPROVAL OF SUBDIVISION PLANS WILL EXPIRE FIVE (5) YEARS FROM THE DATE OF THE INITIAL APPROVAL.
20. VDOT SHALL HAVE PERFORMED THE REQUIRED FIELD INSPECTION (PROOF ROLL) PRIOR TO PLACEMENT OF THE AGGREGATE BASE COURSE(S). CONTACT VDOT, IN WRITING, FOR SUBGRADE INSPECTION 48 HOURS PRIOR TO SCHEDULING PLACEMENT OF AGGREGATE BASE COURSE(S).
21. A PRIME COAT SEAL BETWEEN THE AGGREGATE BASE AND BITUMINOUS CONCRETE WILL BE REQUIRED AT A RATE OF 0.30 GALLONS PER SQUARE YARD (REC-250 PRIME COAT) PER VDOT STANDARDS AND SPECIFICATIONS.
22. THE SCHEDULING OF AGGREGATE BASE INSTALLATION AND SUBSEQUENT PAVING ACTIVITIES SHALL ACCOMMODATE FORECAST WEATHER CONDITIONS PER SECTION 315 OF THE ROAD AND BRIDGE SPECIFICATIONS.
23. VDOT SHALL HAVE APPROVED ALL BASE COURSE(S) FOR DEPTH, TEMPLATE AND PERFORMED THE REQUIRED FIELD INSPECTION (VISUAL, PROOF ROLL, COMPACTION OR ANY ADDITIONAL AS DETERMINED BY VDOT INSPECTOR) PRIOR TO PLACEMENT OF ANY SURFACE COURSE(S). CONTACT VDOT, IN WRITING, FOR INSPECTION OF THE BASE COURSE(S) 48 HOURS PRIOR TO APPLICATION OF THE SURFACE COURSE(S).
24. AN ACTUAL COPY OF THE COMPLETE CBR REPORT IS TO BE SUBMITTED TO VDOT IN CONJUNCTION WITH FINAL PAVEMENT DESIGNS. ALL PAVEMENT DESIGN RECOMMENDATIONS SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT EDITION OF THE PAVEMENT DESIGN GUIDE FOR SUBDIVISION AND SECONDARY ROADS IN VIRGINIA.
25. A LICENSED GEOTECHNICAL ENGINEER SHALL ASCERTAIN CAUSE AND CERTIFY RECOMMENDED METHOD OF REPAIR FOR ALL PAVEMENT STRUCTURAL FAILURES PRIOR TO STATE ACCEPTANCE.
26. ALL VEGETATION AND ORGANIC MATERIAL IS TO BE REMOVED FROM THE RIGHT OF WAY LIMITS PRIOR TO CONDITIONING OF THE SUBGRADE.
27. DRY GUTTER IS NOT ALLOWED IN VDOT RIGHT OF WAY.
28. THE DEVELOPER WILL BE RESPONSIBLE FOR THE DESIGN COSTS OF ANY TRAFFIC SIGNAL INSTALLATION AND/OR MODIFICATION UNDER AN ACCOUNT RECEIVABLE WITH VDOT.
29. THE NECESSITY AND LOCATIONS FOR ADDITIONAL VDOT STANDARD UNDERDRAINS TO BE DETERMINED AT TIME OF SUBGRADE INSPECTION.
30. APPROVAL OF A DETAILED CONSTRUCTION SEQUENCING/MAINTENANCE OF TRAFFIC NARRATIVE FOR THE WORK ZONE IS A PREREQUISITE FOR ISSUANCE OF A LAND USE PERMIT ALLOWING ACCESS TO AND CONSTRUCTION WITHIN VDOT MAINTAINED RIGHT-OF-WAY.
31. VDOT SHALL BE PROVIDED DOCUMENTATION BY A LICENSED GEOTECHNICAL ENGINEER, CERTIFYING THAT ALL IN-PLACE PAVEMENTS MEET OR EXCEED THE APPROVED PAVEMENT DESIGN THICKNESS PRIOR TO STATE ACCEPTANCE. THE CERTIFYING DOCUMENTATION SHALL CONFORM TO VDOT SPECIFICATIONS AND THE APPROVED PLANS.
32. THE ESTABLISHMENT OF A TEMPORARY VEGETATIVE COVER IS REQUIRED ON ALL DENUDED AREAS THAT ARE NOT TO BE FINE GRADED FOR PERIODS LONGER THAN 30 DAYS.
33. NO STRUCTURE SHALL BE CONSTRUCTED ON STATE MAINTAINED RIGHTS OF WAY UNLESS SAID STRUCTURES ARE SHOWN ON ROAD CONSTRUCTION PLANS APPROVED BY VDOT OR COVERED BY A VDOT LAND USE PERMIT (OR BY A LETTER OF INTENT FROM THE RESIDENT ENGINEER TO ISSUE SAID PERMIT AT THE TIME OF STATE ACCEPTANCE).
34. THE DEVELOPER IS RESPONSIBLE FOR CONTACTING THE RICHMOND DISTRICT TRAFFIC ENGINEERING SECTION AT 804-524-6000 FOR GUARDRAIL LOCATION AND PLACEMENT REQUIREMENTS.

ABBREVIATIONS AND SYMBOLS

SYMBOLS

@	AT
℄	CENTERLINE
℘	PLATE
ø	DIAMETER
°	DEGREE

ABBREVIATIONS

A	AREA
AC	ACRE(S)
AWWA	AMERICAN WATER WORKS ASSOCIATION
BLDG.	BUILDING
BOTT.	BOTTOM
CF	CUBIC FEET
CG	CURB AND GUTTER
C.I.	CAST IRON
CI	CURB INLET
CIP	CAST IN PLACE
CJ	CONSTRUCTION JOINT
CLR.	CLEAR
C.O.	CLEANOUT
CONC.	CONCRETE
CONT.	CONTINUOUS
CY	CUBIC YARD(S)
D.B.	DEED BOOK
D.I.	DUCTILE IRON
DI	DROP INLET
DIA.	DIAMETER
DS	DOWNSPOUT
EA.	EACH
E.F.	EACH FACE
ELEV.	ELEVATION
EX.	EXISTING
EXP.	EXPANSION
E.W.	EACH WAY
FC	FACE OF CURB
FF	FINISHED FLOOR
FL	FLOW LINE
FT	FOOT (FEET)
GA	GAUGE
GALV.	GALVANIZED
GS	GROUND SHOT
ID	INSIDE DIAMETER
INV.	INVERT
JT.	JOINT
LAT	LATERAL
LB	POUND
LBS	POUNDS
LF	LINEAR FOOT (FEET)
MAT'L.	MATERIAL
MAX.	MAXIMUM
MFR.	MANUFACTURER
MH	MANHOLE
MIN.	MINIMUM
M.J.	MECHANICALLY JOINED
O.C.	ON CENTER
OD	OUTSIDE DIAMETER
PB	PARCEL BOOK
PL	PROPERTY LINE
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
REQ'D.	REQUIRED
R/W	RIGHT-OF-WAY
IINV.	SANITARY
SF	SQUARE FOOT (FEET)
SPEC.	SPECIFICATION
SPECS	SPECIFICATIONS
SQ.	SQUARE
STM	STORM
STD.	STANDARD
SW	SIDEWALK
SWM	STORM WATER MANAGEMENT
SY	SQUARE YARD(S)
TC	TOP OF CURB
TDC	TURNED DOWN CURB
TEMP.	TEMPORARY
TYP.	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VAR.	VARIABLE
VDOT	VIRGINIA DEPARTMENT OF TRANSPORTATION
VESCH	VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK
WV	WATER VALVE
WWF	WELDED WIRE FABRIC

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NOTES
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 1,000'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

2.0

STATE MINIMUM STANDARDS FOR EROSION CONTROL

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

GENERAL EROSION AND SEDIMENT CONTROL NOTES

ES-1: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS 9VAC25-840.

ES-2: THE PLAN APPROVING AUTHORITY MUST BE NOTIFIED ONE WEEK PRIOR TO THE PRE-CONSTRUCTION CONFERENCE, ONE WEEK PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITY, AND ONE WEEK PRIOR TO THE FINAL INSPECTION.

ES-3: ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.

ES-4: A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.

ES-5: PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE PLAN APPROVING AUTHORITY.

ES-6: THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE PLAN APPROVING AUTHORITY.

ES-7: ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.

ES-8: DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE.

ES-9: THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.

MINIMUM STANDARDS

A VESCP MUST BE CONSISTENT WITH THE FOLLOWING CRITERIA, TECHNIQUES AND METHODS:

MS-1 PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.

MS-2 DURING CONSTRUCTION OF THE PROJECT, SOIL STOCKPILES AND BORROW AREAS SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE CONTRACTOR IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.

MS-3 A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT IS UNIFORM, MATURE ENOUGH TO SURVIVE, AND WILL INHIBIT EROSION.

MS-4 SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS, AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.

MS-5 STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.

MS-6 SEDIMENT TRAPS AND SEDIMENT BASINS SHALL BE DESIGNED AND CONSTRUCTED BASED UPON THE TOTAL DRAINAGE AREA TO BE SERVED BY THE TRAP OR BASIN.

A. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT TRAP SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA AND THE TRAP SHALL ONLY CONTROL DRAINAGE AREAS LESS THAT THREE ACRES.

B. SURFACE RUNOFF FROM DISTURBED AREAS THAT IS COMPRISED OF FLOW FROM DRAINAGE AREAS GREATER THAN OR EQUAL TO THREE ACRES SHALL BE CONTROLLED BY A SEDIMENT BASIN. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT BASIN SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA. THE OUTFALL SYSTEM SHALL, AT A MINIMUM, MAINTAIN THE STRUCTURAL INTEGRITY OF THE BASIN DURING A TWENTY-FIVE YEAR STORM OF 24-HOUR DURATION. RUNOFF COEFFICIENTS USED IN RUNOFF CALCULATIONS SHALL CORRESPOND TO A BARE EARTH CONDITION OR THOSE CONDITIONS EXPECTED TO EXIST WHILE THE SEDIMENT BASIN IS UTILIZED.

MS-7 CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE ERODING EXCESSIVELY WITHIN ONE YEAR OF PERMANENT STABILIZATION SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.

MS-8 CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE.

MS-9 WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.

MS-10 ALL STORM SEWER INLETS THAT ARE MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SEDIMENT-LADEN WATER CANNOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.

MS-11 BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND RECEIVING CHANNEL.

MS-12 WHEN WORK IN A LIVE WATERCOURSE IS PERFORMED, PRECAUTIONS SHALL BE TAKEN TO MINIMIZE ENCROACHMENT, CONTROL SEDIMENT TRANSPORT AND STABILIZE THE WORK AREA TO THE GREATEST EXTENT POSSIBLE DURING CONSTRUCTION. NONERODIBLE MATERIAL SHALL BE USED FOR THE CONSTRUCTION OF CAUSEWAYS AND COFFERDAMS. EARTHEN FILL MAY BE USED FOR THESE STRUCTURES IF ARMORED BY NONERODIBLE COVER MATERIALS.

MS-13 WHEN A LIVE WATERCOURSE MUST BE CROSSED BY CONSTRUCTION VEHICLES MORE THAN TWICE IN ANY SIX-MONTH PERIOD, A TEMPORARY VEHICULAR STREAM CROSSING CONSTRUCTED OF NONERODIBLE MATERIAL SHALL BE PROVIDED.

MS-14 ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS PERTAINING TO WORKING IN OR CROSSING LIVE WATERCOURSES SHALL BE MET.

MS-15 THE BED AND BANKS OF A WATERCOURSE SHALL BE STABILIZED IMMEDIATELY AFTER WORK IN THE WATERCOURSE IS COMPLETED.

MS-16 UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:

A. NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.

B. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.

C. EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.

D. MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND PROMOTE STABILIZATION.

E. RESTABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THESE REGULATIONS.

F. APPLICABLE SAFETY REGULATIONS SHALL BE COMPLIED WITH.

MS-17 WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY VEHICULAR TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED OR PUBLIC ROAD SURFACE, THE ROAD SURFACE SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER. THIS PROVISION SHALL APPLY TO INDIVIDUAL DEVELOPMENT LOTS AS WELL AS TO LARGER LAND-DISTURBING ACTIVITIES.

MS-18 ALL TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE VESCP. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.

MS-19 PROPERTIES AND WATERWAYS DOWNSTREAM FROM DEVELOPMENT SITES SHALL BE PROTECTED FROM SEDIMENT DEPOSITION, EROSION AND DAMAGE DUE TO INCREASES IN VOLUME, VELOCITY AND PEAK FLOW RATE OF STORMWATER RUNOFF FOR THE STATED FREQUENCY STORM OF 24-HOUR DURATION IN ACCORDANCE WITH THE FOLLOWING STANDARDS AND CRITERIA:

A. CONCENTRATED STORMWATER RUNOFF LEAVING A DEVELOPMENT SITE SHALL BE DISCHARGED DIRECTLY INTO AN ADEQUATE NATURAL OR MAN-MADE RECEIVING CHANNEL, PIPE OR STORM SEWER SYSTEM. FOR THOSE SITES WHERE RUNOFF IS DISCHARGED INTO A PIPE OR PIPE SYSTEM, DOWNSTREAM STABILITY ANALYSES AT THE OUTFALL OF THE PIPE OR PIPE SYSTEM SHALL BE PERFORMED.

B. ADEQUACY OF ALL CHANNELS AND PIPES SHALL BE VERIFIED IN THE FOLLOWING MANNER:

(1) THE APPLICANT SHALL DEMONSTRATE THAT THE TOTAL DRAINAGE AREA TO THE POINT OF ANALYSIS WITHIN THE CHANNEL IS ONE HUNDRED TIMES GREATER THAN THE CONTRIBUTING DRAINAGE AREA OF THE PROJECT IN QUESTION; OR

(2)(A) NATURAL CHANNELS SHALL BE ANALYZED BY THE USE OF A TWO-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP CHANNEL BANKS NOR CAUSE EROSION OF CHANNEL BED OR BANKS.

(2)(B) ALL PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS SHALL BE ANALYZED BY THE USE OF A TEN-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP ITS BANKS AND BY THE USE OF A TWO-YEAR STORM TO DEMONSTRATE THAT STORMWATER WILL NOT CAUSE EROSION OF CHANNEL BED OR BANKS; AND

(2)(C) PIPES AND STORM SEWER SYSTEMS SHALL BE ANALYZED BY THE USE OF A TEN-YEAR STORM TO VERIFY THAT STORMWATER WILL BE CONTAINED WITHIN THE PIPE OR SYSTEM.

C. IF EXISTING NATURAL RECEIVING CHANNELS OR PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS OR PIPES ARE NOT ADEQUATE, THE APPLICANT SHALL:

(1) IMPROVE THE CHANNEL TO A CONDITION WHERE A TEN-YEAR STORM WILL NOT OVERTOP THE BANKS AND A TWO-YEAR STORM WILL NOT CAUSE EROSION TO THE CHANNEL THE BED OR BANKS; OR

(2) IMPROVE THE PIPE OR PIPE SYSTEM TO A CONDITION WHERE THE TEN-YEAR STORM IS CONTAINED WITHIN THE APPURTENANCES; OR

(3) DEVELOP A SITE DESIGN THAT WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A TWO-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A NATURAL CHANNEL OR WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A TEN-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A MAN-MADE CHANNEL; OR

(4) PROVIDE A COMBINATION OF CHANNEL IMPROVEMENT, STORMWATER DETENTION OR OTHER MEASURES WHICH IS SATISFACTORY TO THE VESCP AUTHORITY TO PREVENT DOWNSTREAM EROSION.

D. THE APPLICANT SHALL PROVIDE EVIDENCE OF PERMISSION TO MAKE THE IMPROVEMENTS.

E. ALL HYDROLOGIC ANALYSES SHALL BE BASED ON THE EXISTING WATERSHED CHARACTERISTICS AND THE ULTIMATE DEVELOPMENT OF THE SUBJECT PROJECT.

F. IF THE APPLICANT CHOOSES AN OPTION THAT INCLUDES STORMWATER DETENTION, HE SHALL OBTAIN APPROVAL FROM THE VESCP OF A PLAN FOR MAINTENANCE OF THE DETENTION FACILITIES. THE PLAN SHALL SET FORTH THE MAINTENANCE REQUIREMENTS OF THE FACILITY AND THE PERSON RESPONSIBLE FOR PERFORMING THE MAINTENANCE.

G. OUTFALL FROM A DETENTION FACILITY SHALL BE DISCHARGED TO A RECEIVING CHANNEL, AND ENERGY DISSIPATERS SHALL BE PLACED AT THE OUTFALL OF ALL DETENTION FACILITIES AS NECESSARY TO PROVIDE A STABILIZED TRANSITION FROM THE FACILITY TO THE RECEIVING CHANNEL.

H. ALL ON-SITE CHANNELS MUST BE VERIFIED TO BE ADEQUATE.

I. INCREASED VOLUMES OF SHEET FLOWS THAT MAY CAUSE EROSION OR SEDIMENTATION ON ADJACENT PROPERTY SHALL BE DIVERTED TO A STABLE OUTLET, ADEQUATE CHANNEL, PIPE OR PIPE SYSTEM, OR TO A DETENTION FACILITY.

J. IN APPLYING THESE STORMWATER MANAGEMENT CRITERIA, INDIVIDUAL LOTS OR PARCELS IN A RESIDENTIAL, COMMERCIAL OR INDUSTRIAL DEVELOPMENT SHALL NOT BE CONSIDERED TO BE SEPARATE DEVELOPMENT PROJECTS. HYDROLOGIC PARAMETERS THAT REFLECT THE ULTIMATE DEVELOPMENT CONDITION SHALL BE USED IN ALL ENGINEERING CALCULATIONS.

K. ALL MEASURES USED TO PROTECT PROPERTIES AND WATERWAYS SHALL BE EMPLOYED IN A MANNER WHICH MINIMIZES IMPACTS ON THE PHYSICAL, CHEMICAL AND BIOLOGICAL INTEGRITY OF RIVERS, STREAMS AND OTHER WATERS OF THE STATE.

L. ANY PLAN APPROVED PRIOR TO JULY 1, 2014, THAT PROVIDES FOR STORMWATER MANAGEMENT THAT ADDRESSES ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS SHALL SATISFY THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS IF THE PRACTICES ARE DESIGNED TO (I) DETAIN THE WATER QUALITY VOLUME AND TO RELEASE IT OVER 48 HOURS; (II) DETAIN AND RELEASE OVER A 24-HOUR PERIOD THE EXPECTED RAINFALL RESULTING FROM THE ONE YEAR, 24-HOUR STORM; AND (III) REDUCE THE ALLOWABLE PEAK FLOW RATE RESULTING FROM THE 1.5, 2, AND 10-YEAR, 24-HOUR STORMS TO A LEVEL THAT IS LESS THAN OR EQUAL TO THE PEAK FLOW RATE FROM THE SITE ASSUMING IT WAS IN A GOOD FORESTED CONDITION, ACHIEVED THROUGH MULTIPLICATION OF THE FORESTED PEAK FLOW RATE BY A REDUCTION FACTOR THAT IS EQUAL TO THE RUNOFF VOLUME FROM THE SITE WHEN IT WAS IN A GOOD FORESTED CONDITION DIVIDED BY THE RUNOFF VOLUME FROM THE SITE IN ITS PROPOSED CONDITION, AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS AS DEFINED IN ANY REGULATIONS PROMULGATED PURSUANT TO § 62.1-44.15:54 OR 62.1-44.15:65 OF THE ACT.

M. FOR PLANS APPROVED ON AND AFTER JULY 1, 2014, THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS OF § 62.1-44.15:52 A OF THE ACT AND THIS SUBSECTION SHALL BE SATISFIED BY COMPLIANCE WITH WATER QUANTITY REQUIREMENTS IN THE STORMWATER MANAGEMENT ACT (§ 62.1-44.15:24 ET SEQ. OF THE CODE OF VIRGINIA) AND ATTENDANT REGULATIONS, UNLESS SUCH LAND-DISTURBING ACTIVITIES (I) ARE IN ACCORDANCE WITH PROVISIONS FOR TIME LIMITS ON APPLICABILITY OF APPROVED DESIGN CRITERIA IN 9VAC25-870-47 OR GRANDFATHERING IN 9VAC25-870-48 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATION, IN WHICH CASE THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS OF § 62.1-44.15:52 A OF THE ACT SHALL APPLY, OR (II) ARE EXEMPT PURSUANT TO § 62.1-44.15:34 C 7 OF THE ACT.

N. COMPLIANCE WITH THE WATER QUANTITY MINIMUM STANDARDS SET OUT IN 9VAC25-870-66 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATIONS SHALL BE DEEMED TO SATISFY THE REQUIREMENTS OF SUBDIVISION 19 OF THIS SUBSECTION.

STATUTORY AUTHORITY

§ 62.1-44.15:52 OF THE CODE OF VIRGINIA.

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NOTES

GREEN RIDGE RECYCLING & DISPOSAL FACILITY

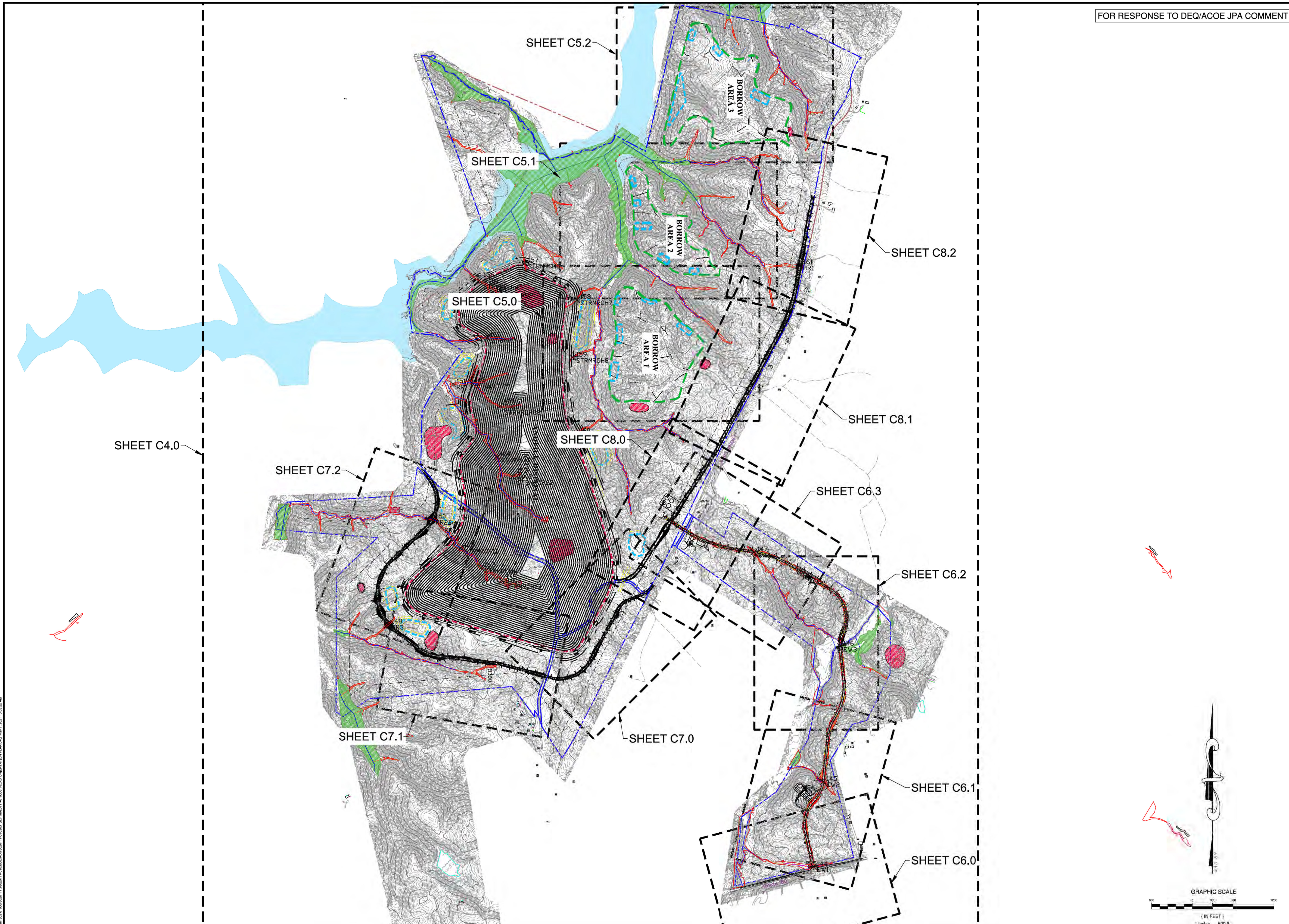
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 1,000'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

2.1

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



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OVERALL SHEET LAYOUT PLAN

GREEN RIDGE RECYCLING & DISPOSAL FACILITY

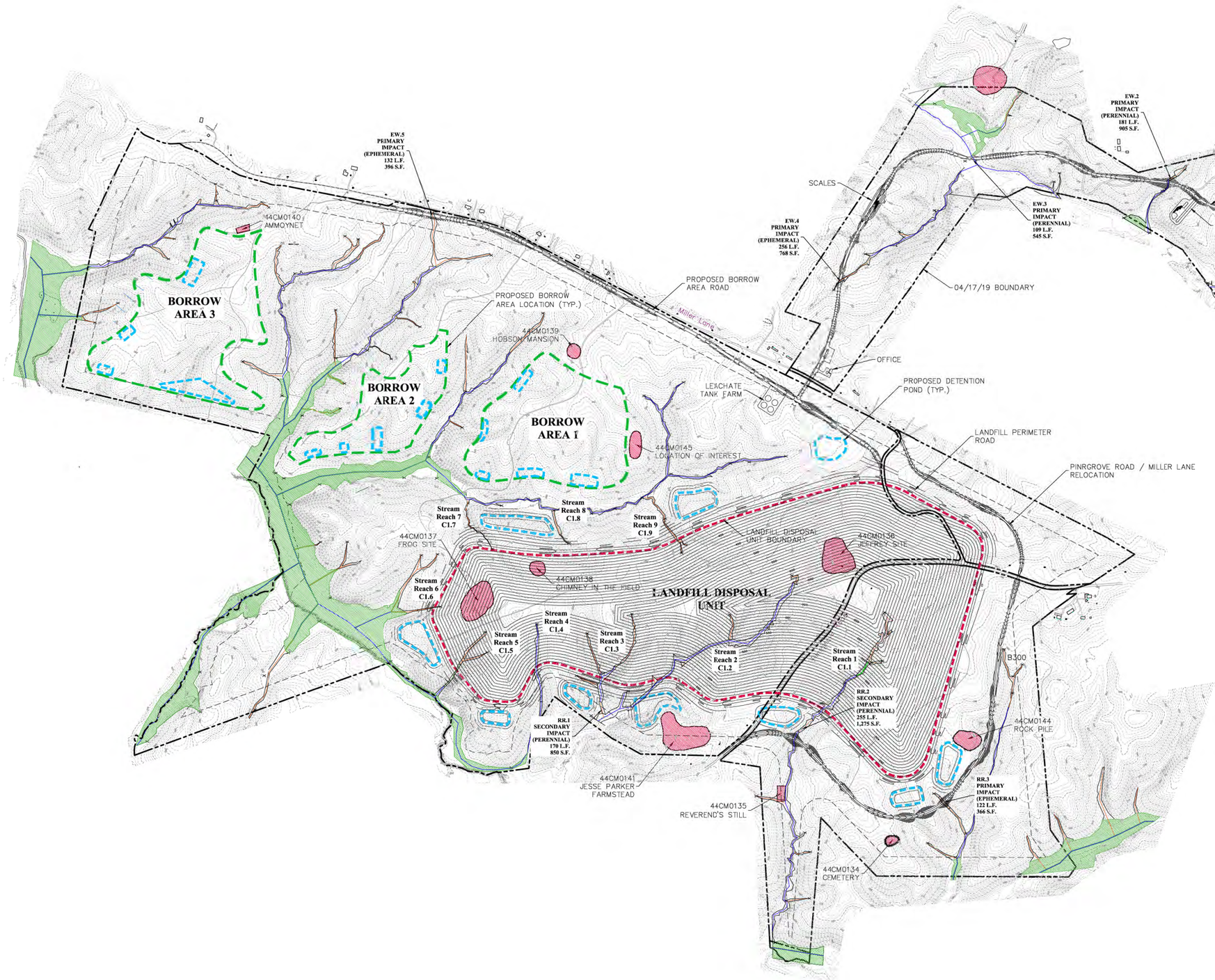
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 600'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

3.0

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



LEGEND:

- PROPERTY BOUNDARY (FACILITY BOUNDARY)
- 330 EXISTING MAJOR CONTOURS
- 330 FINAL GRADE MAJOR CONTOURS
- DELINEATED WETLANDS
- POTENTIAL CULTURAL RESOURCES OF INTEREST (SEE "GREEN RIDGE LANDFILL, PHASE 1 CULTURA RESOURCES EVALUATION REPORT")
- EXISTING ROAD
- PROPOSED ROAD
- R3/R4 STREAMS
- EPH EPHEMERAL CHANNEL
- 200 FOOT BUFFER
- LANDFILL DISPOSAL UNIT BOUNDARY
- PROPOSED BORROW AREA LOCATION
- PROPOSED DETENTION POND / SEDIMENT TRAP LOCATION

NOTES:

1. THIS MAPPING PROJECT, L18-10560, WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF, ROBERT H. TUCK FROM AN ACTUAL AIRBORNE SURVEY MADE UNDER MY SUPERVISION; THAT THE IMAGERY AND/OR ORIGINAL DATA WAS OBTAINED ON 05-02-18; AND THAT THIS PLAT, MAP, OR DIGITAL GEOSPATIAL DATA INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.
2. PARCEL LINES SHOWN HEREON ARE PER BOUNDARY SURVEYS BY HIGHMARK ENGINEERING DATED MAY 24, 2018, MARCH 4, 2019, APRIL 17, 2019 AND PER BOUNDARY SURVEY BY DRAPER ADEN ASSOCIATES DATED MARCH 29, 2019.
3. WETLANDS INFORMATION PROVIDED BY A SURVEY PERFORMED BY KOONTZ BRYANT JOHNSON WILLIAMS GROUP, DATED AUGUST 22, 2018, REVISED MAY 10, 2019..
4. EXISTING CONTOUR INTERVALS ARE 2 FOOT. PROPOSED CONTOUR INTERVALS ARE 10 FOOT.

North

GRAPHIC SCALE

500 0 500 1000

(IN FEET)

1 inch = 500 ft.

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LANDFILL DISPOSAL UNIT
GREEN RIDGE RECYCLING & DISPOSAL FACILITY

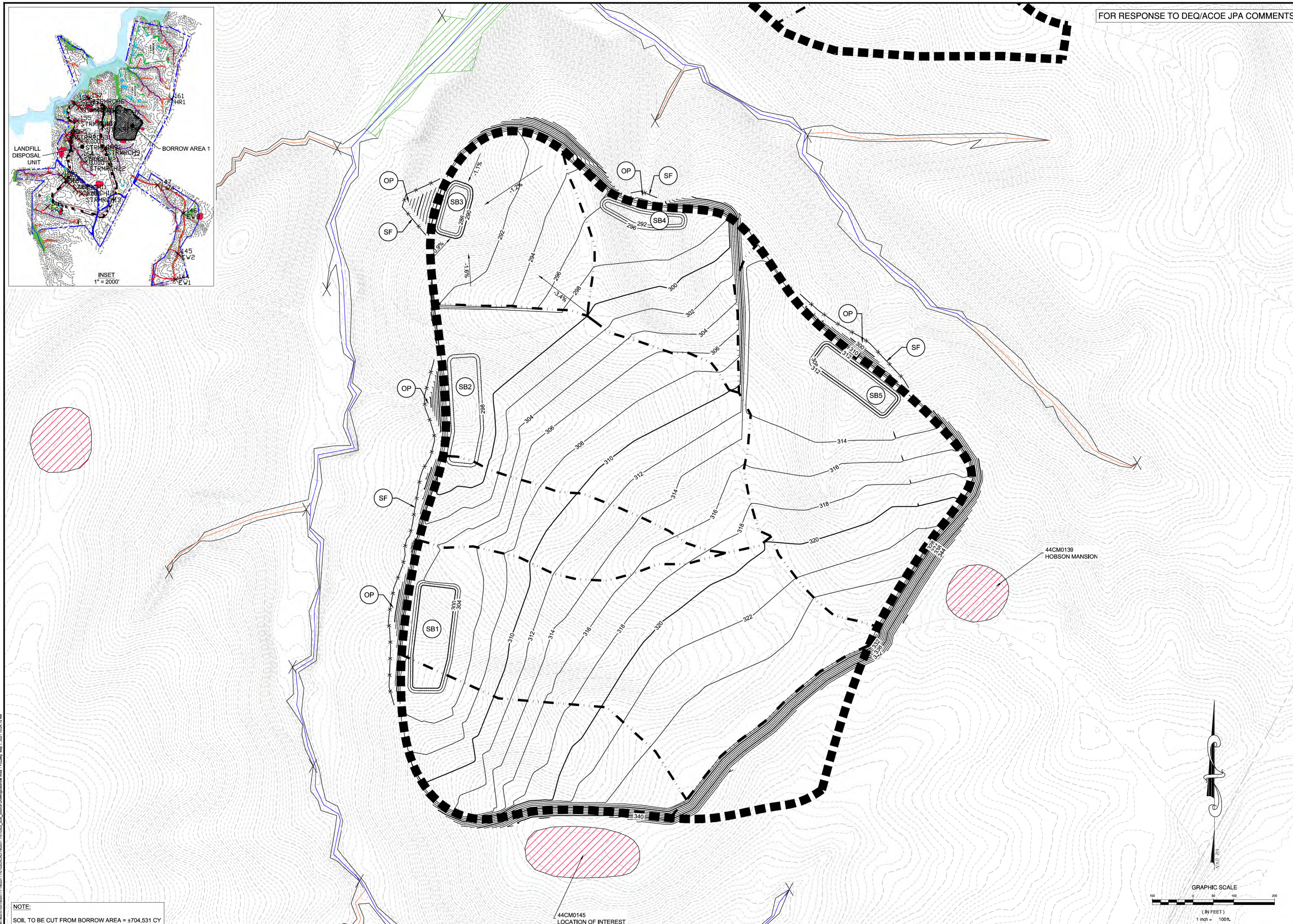
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	AST
DRAWN BY:	DLD
CHECKED BY:	LPK
SCALE:	1" = 500'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

4.0

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



NOTE:

SOIL TO BE CUT FROM BORROW AREA = ±704,531 CY

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BORROW AREA 1 GRADING PLAN

GREEN RIDGE RECYCLING & DISPOSAL FACILITY

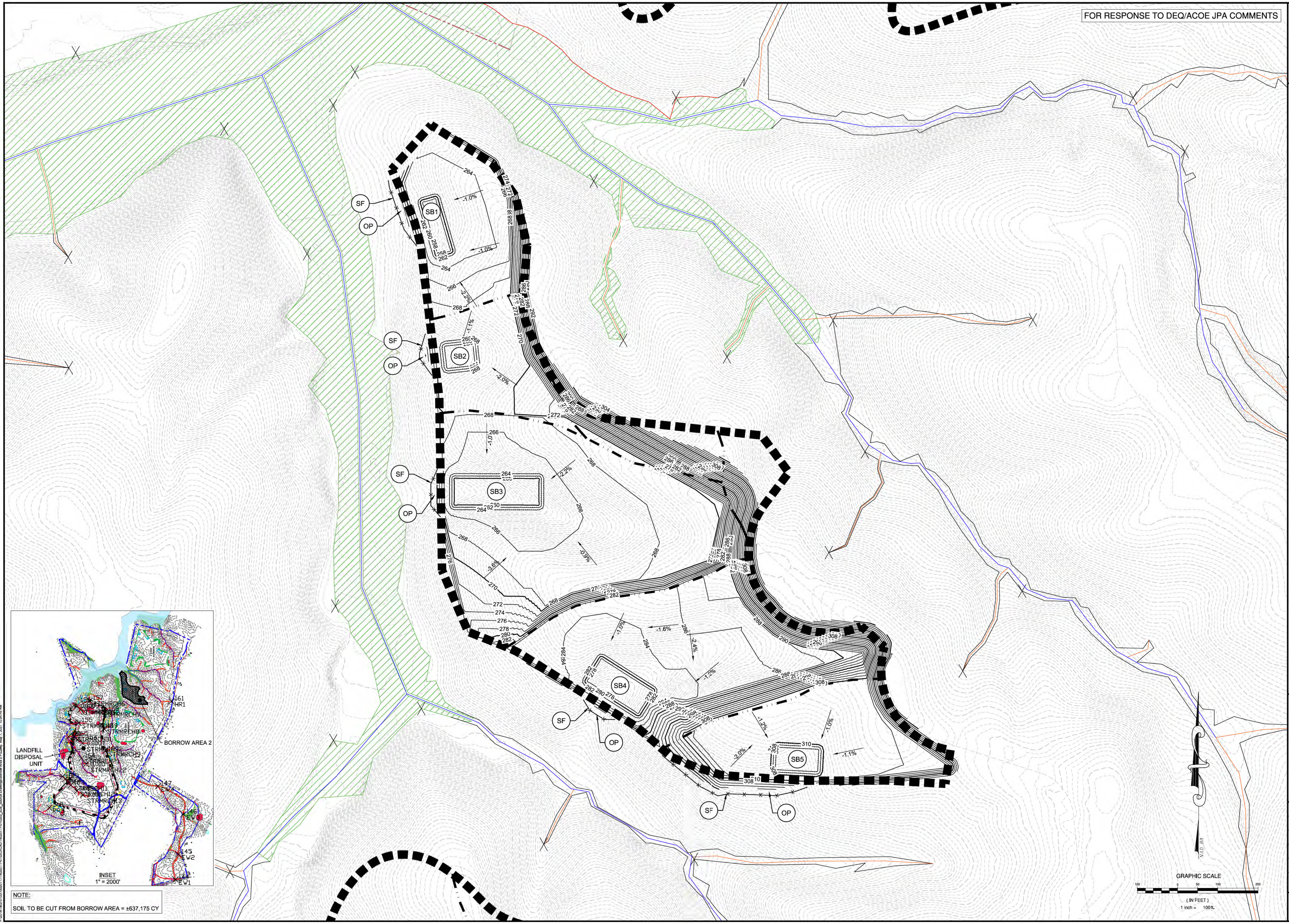
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 100'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

5.0

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



NOTE:

SOIL TO BE CUT FROM BORROW AREA = ±637,175 CY

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BORROW AREA 2 GRADING PLAN

GREEN RIDGE RECYCLING & DISPOSAL FACILITY

CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 100'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

5.1

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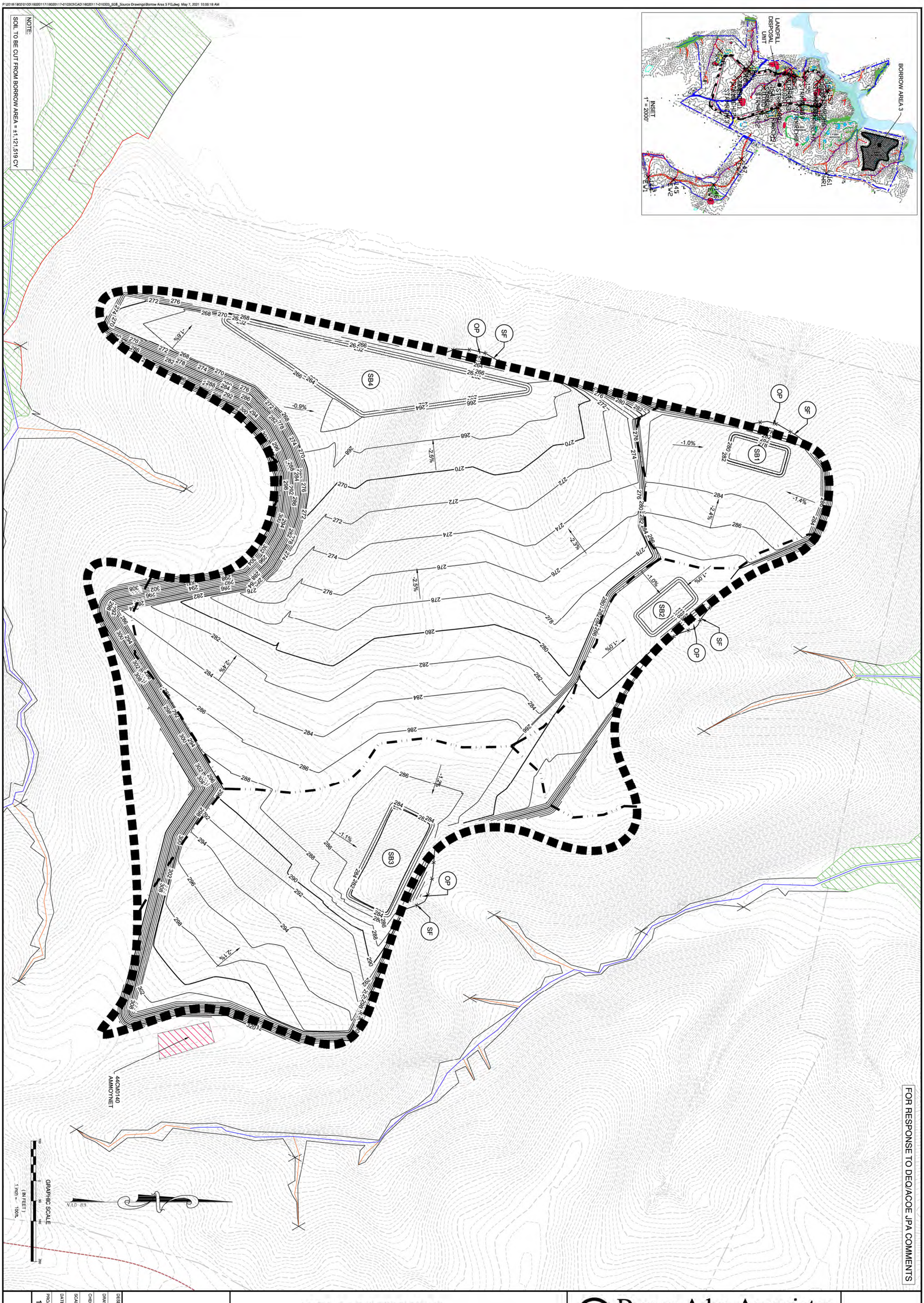

5.2

PROJECT NUMBER	1802011 7-090102
DATE	APRIL 22, 2021
SCALE	1" = 100'
CHECKED BY	GWC
DRAWN BY	EEH
DESIGNED BY	EEH

REVISIONS

BORROW AREA 3 GRADING PLAN

GREEN RIDGE RECYCLING & DISPOSAL FACILITY

CUMBERLAND COUNTY, VIRGINIA

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FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
3.21	LEVEL SPREADER	LS	
3.31	TEMPORARY SEEDING	TS	TS
3.35	MULCHING	MU	MU
3.39	DUST CONTROL	DC	DC

GRAPHIC SCALE

80 0 40 80 160

(IN FEET)
1 inch = 80ft.

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ENTRANCE ROAD ESC PLAN

GREEN RIDGE RECYCLING & DISPOSAL FACILITY

CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 80'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

6.0

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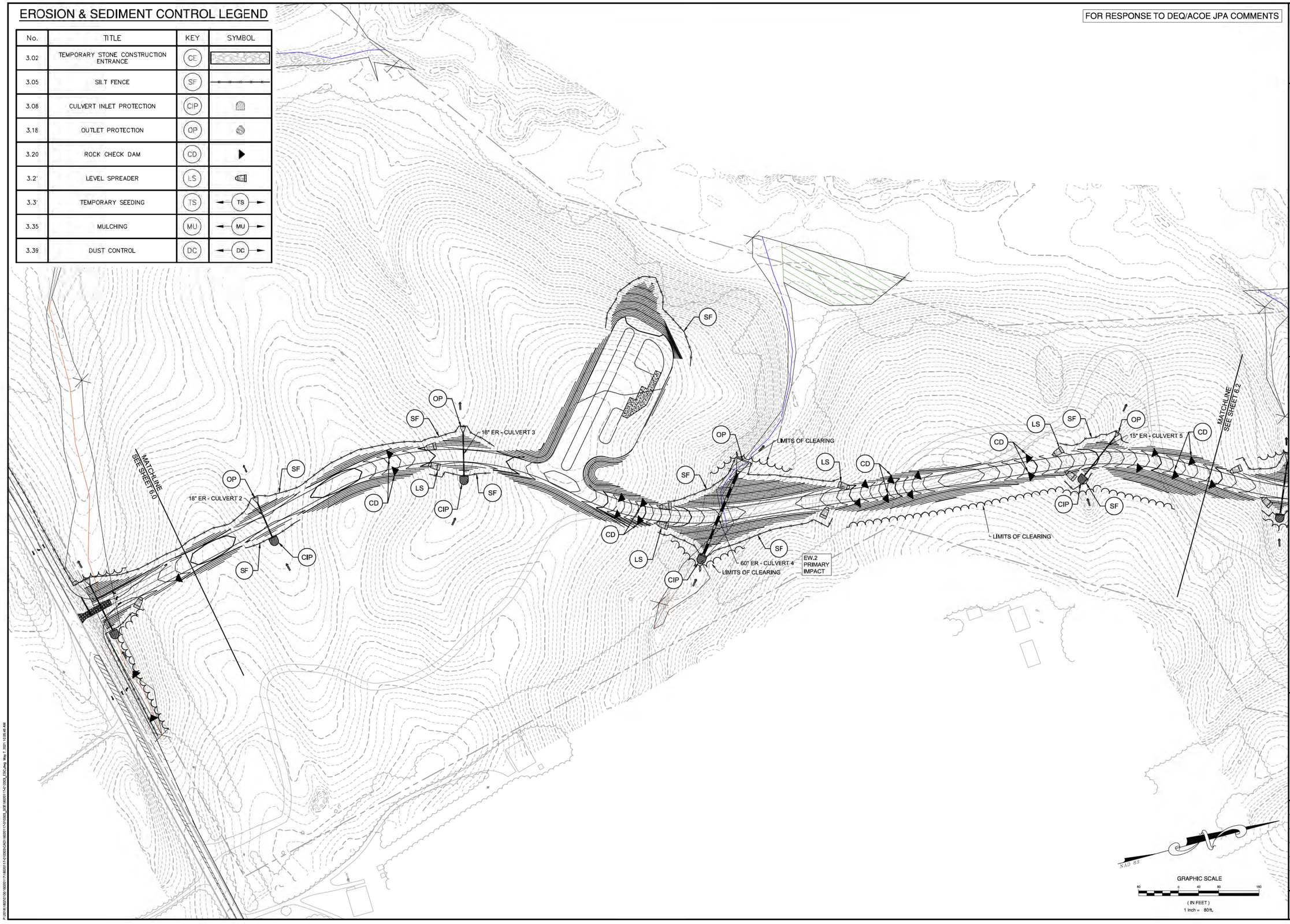
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
3.21	LEVEL SPREADER	LS	
3.31	TEMPORARY SEEDING	TS	TS
3.35	MULCHING	MU	MU
3.39	DUST CONTROL	DC	DC



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ENTRANCE ROAD ESC PLAN
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

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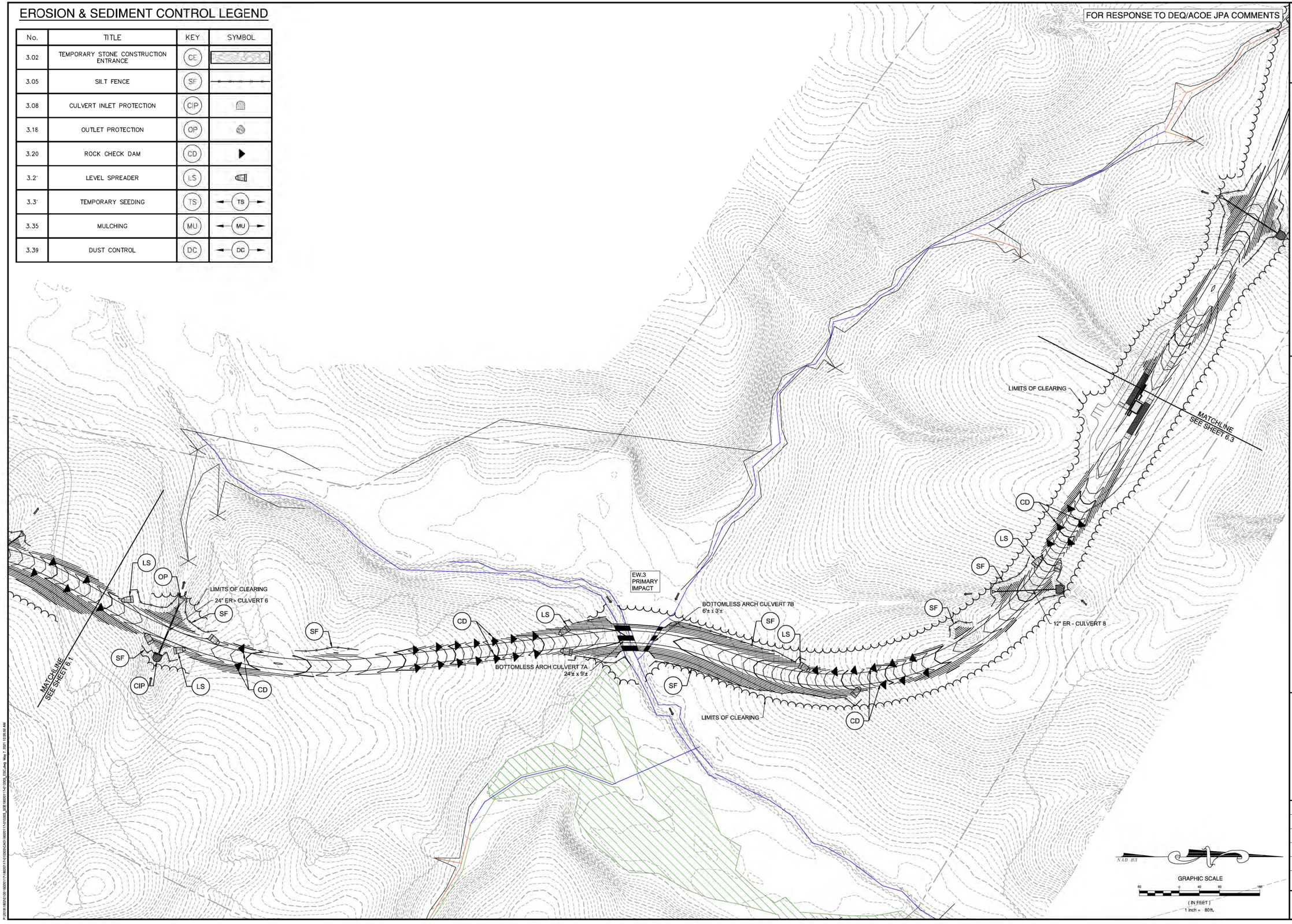
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
3.2'	LEVEL SPREADER	LS	
3.3'	TEMPORARY SEEDING	TS	TS
3.35	MULCHING	MU	MU
3.39	DUST CONTROL	DC	DC



NAD 83

GRAPHIC SCALE

80 0 40 80 160

(IN FEET)

1 inch = 80ft.

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ENTRANCE ROAD ESC PLAN
GREEN RIDGE RECYCLING & DISPOSAL FACILITY

CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 80'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

6.2

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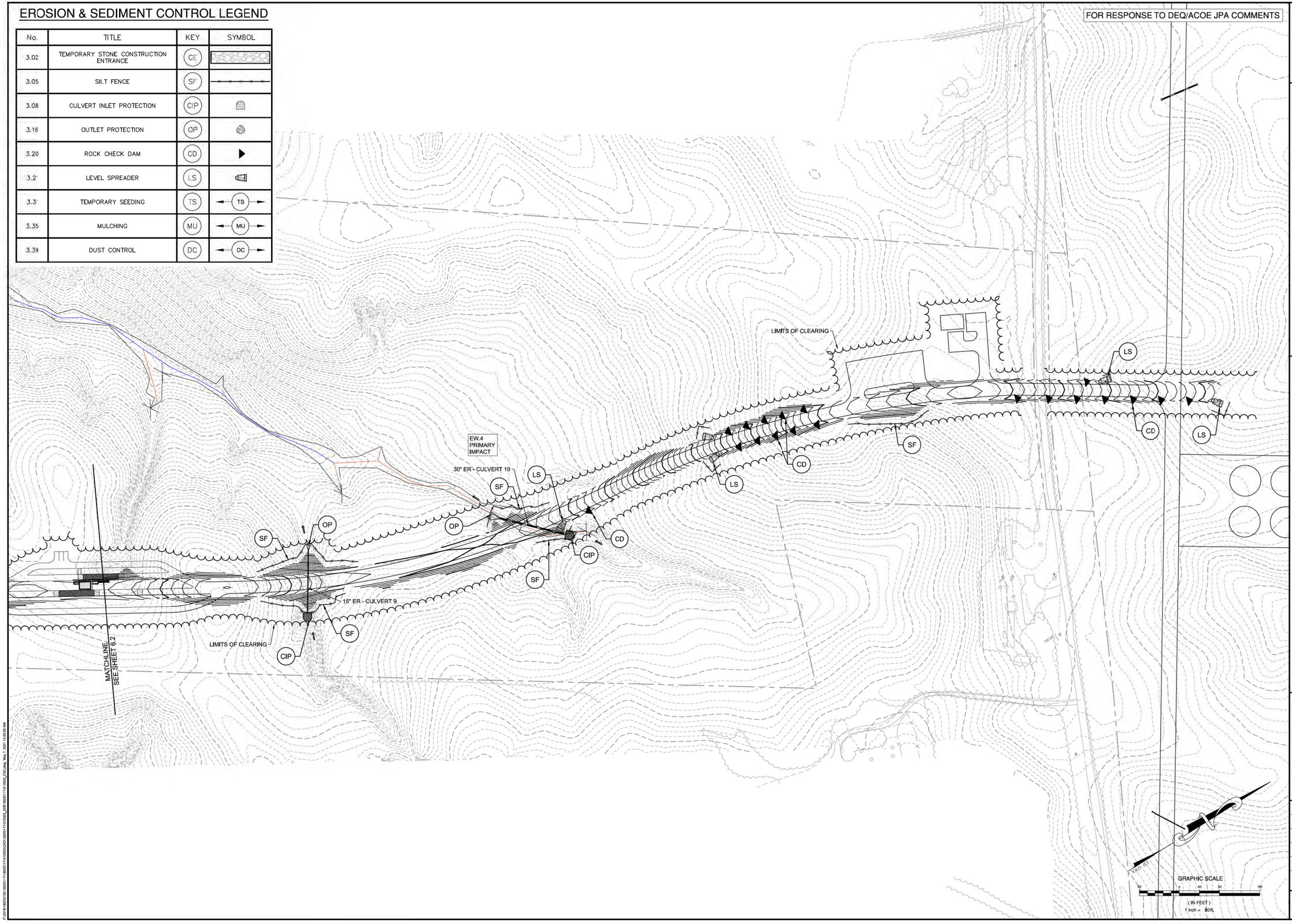
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
3.2'	LEVEL SPREADER	LS	
3.3'	TEMPORARY SEEDING	TS	TS
3.35	MULCHING	MU	MU
3.39	DUST CONTROL	DC	DC



GRAPHIC SCALE
80 0 40 80 160
(IN FEET)
1 inch = 80ft.

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GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

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6.3

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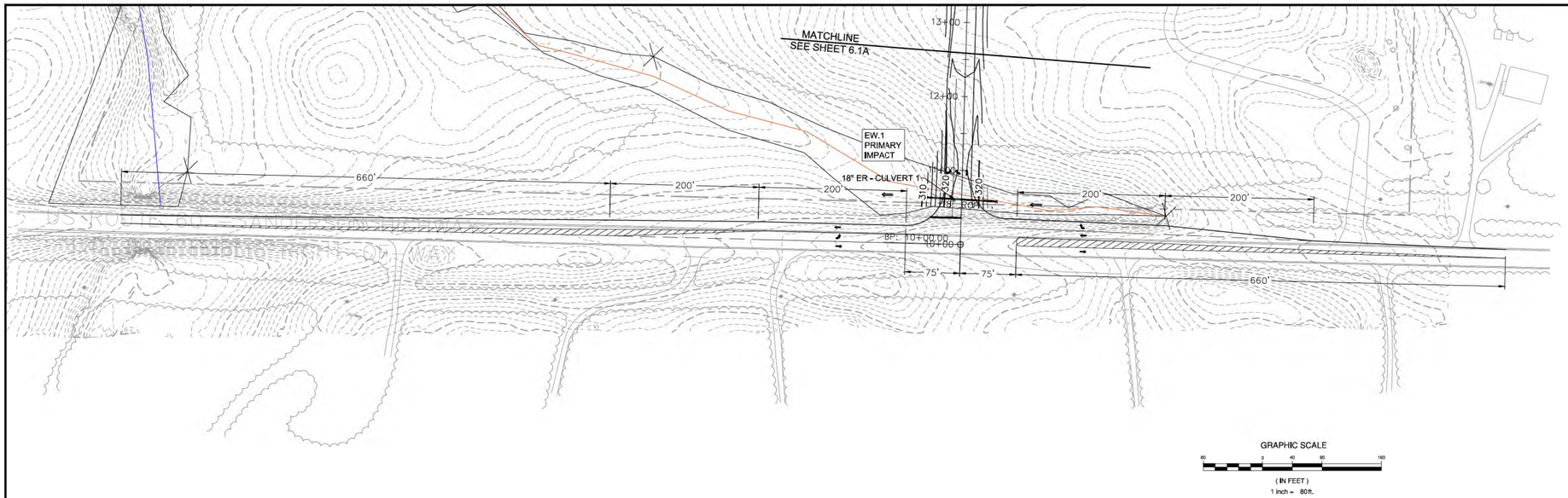
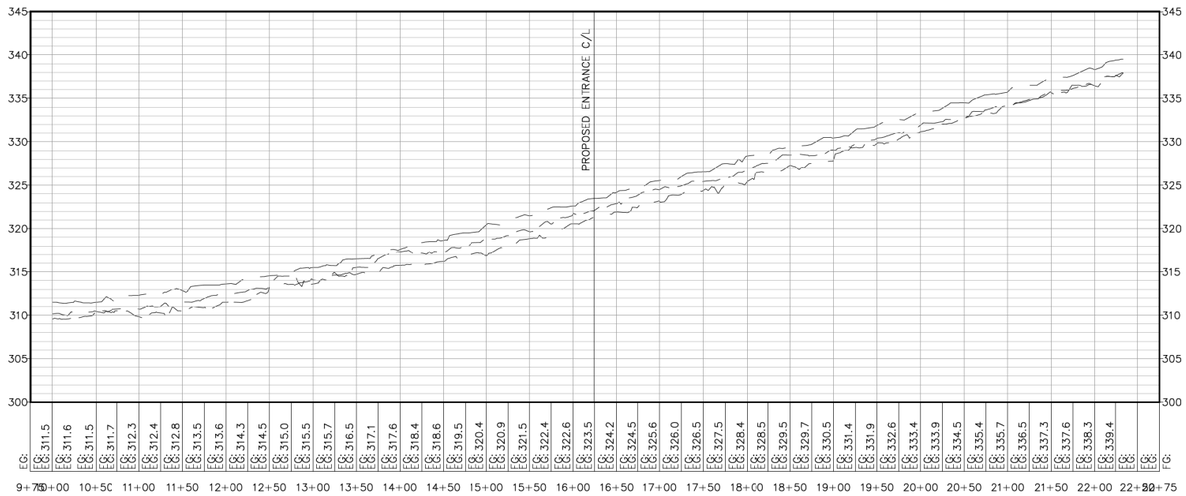
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS





ALGN–ANDERSON HIGHWAY–2 – Scale: H: 1"=80', V: 1"= 8'

PROFILE LEGEND

EG	*EXISTING GRADE*
FG	*FINISHED GRADE*
——— – ———	*EXISTING CENTERLINE PROFILE*
—— ——— ——	*EXISTING 25' LEFT PROFILE*
— — — — —	*EXISTING 25' RIGHT PROFILE*
———	*PROPOSED CENTERLINE PROFILE*

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GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

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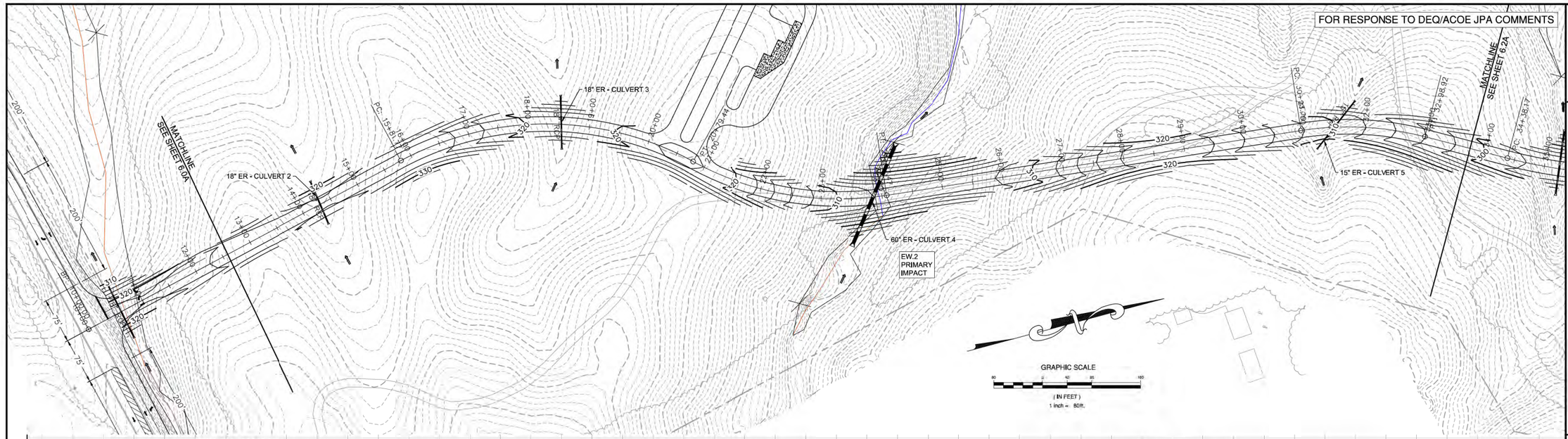
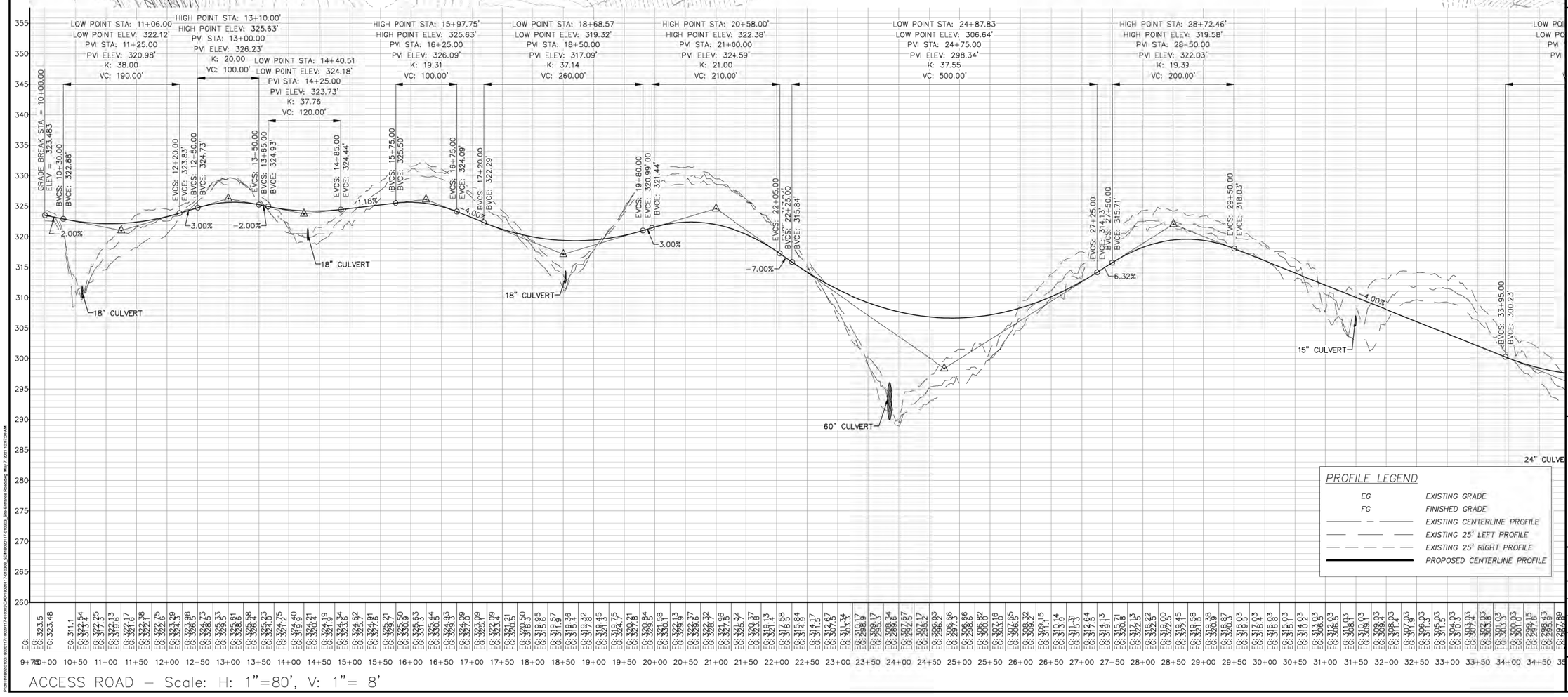
6.0A

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS





PROFILE LEGEND

EG	EXISTING GRADE
FG	FINISHED GRADE
	EXISTING CENTERLINE PROFILE
	EXISTING 25' LEFT PROFILE
	EXISTING 25' RIGHT PROFILE
	PROPOSED CENTERLINE PROFILE

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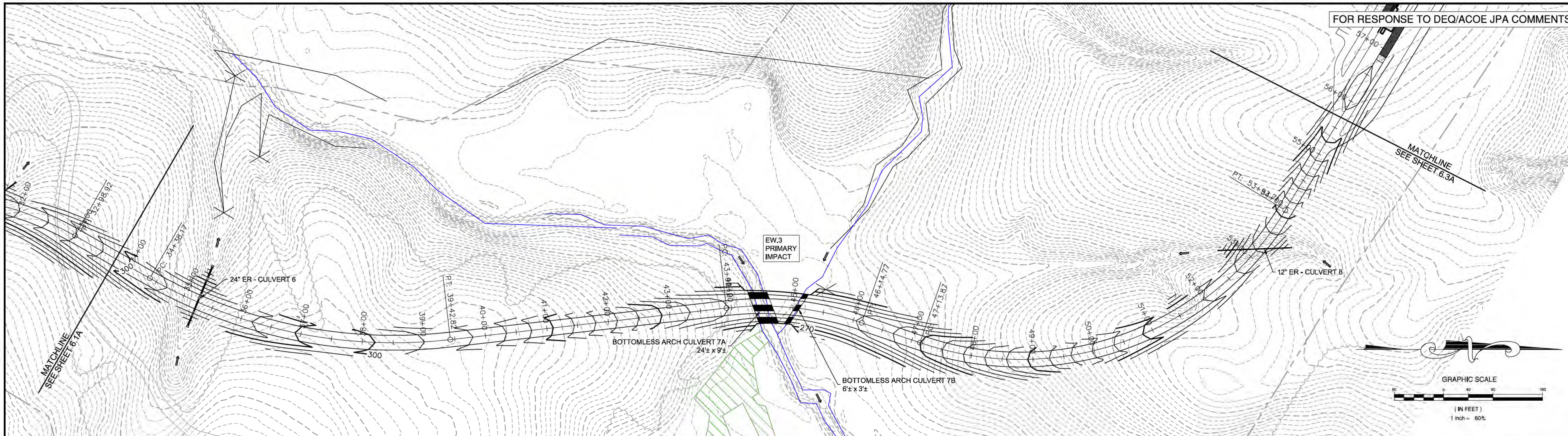
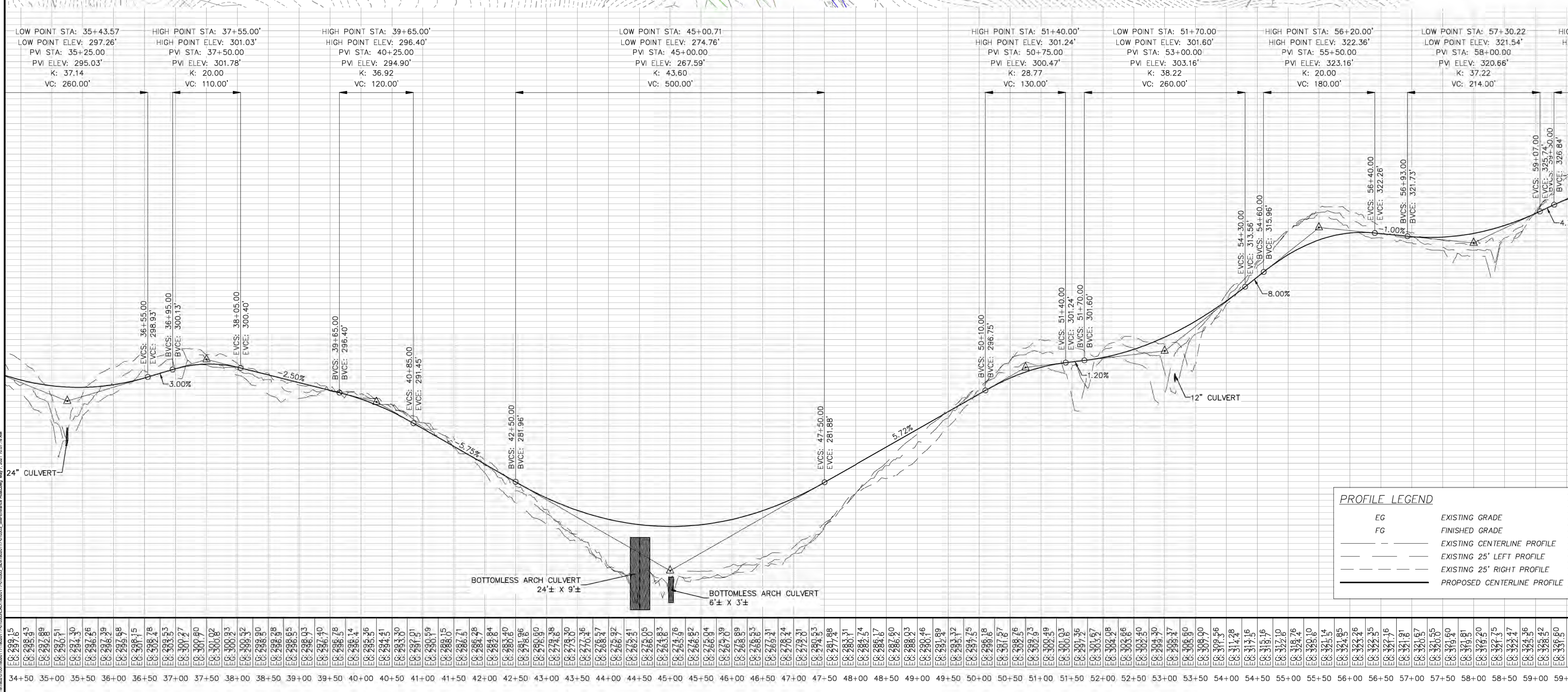
6.1A

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS





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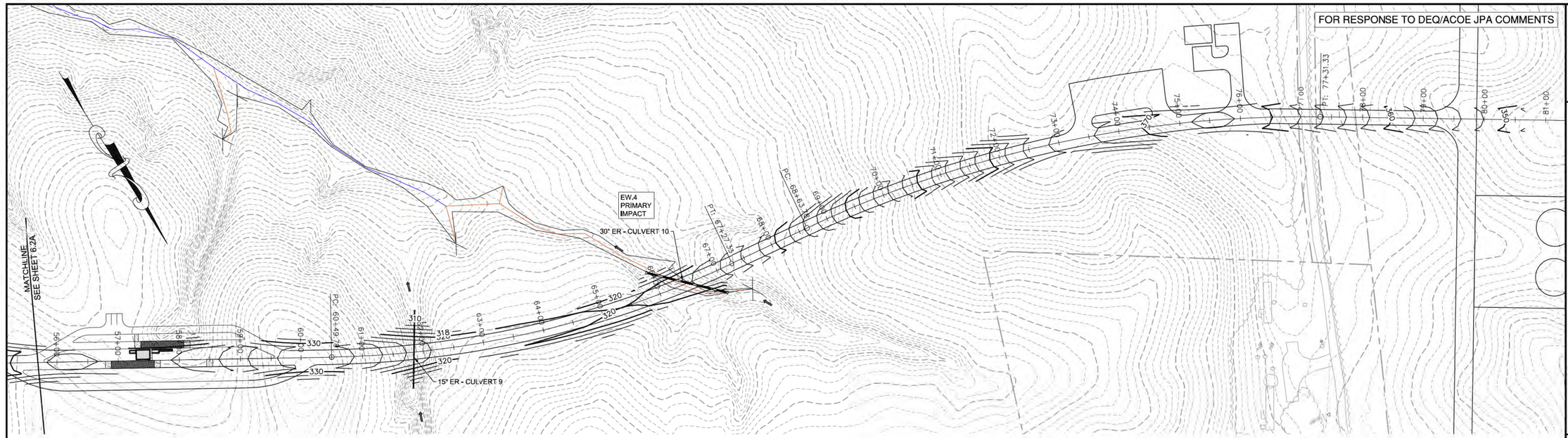
6.2A

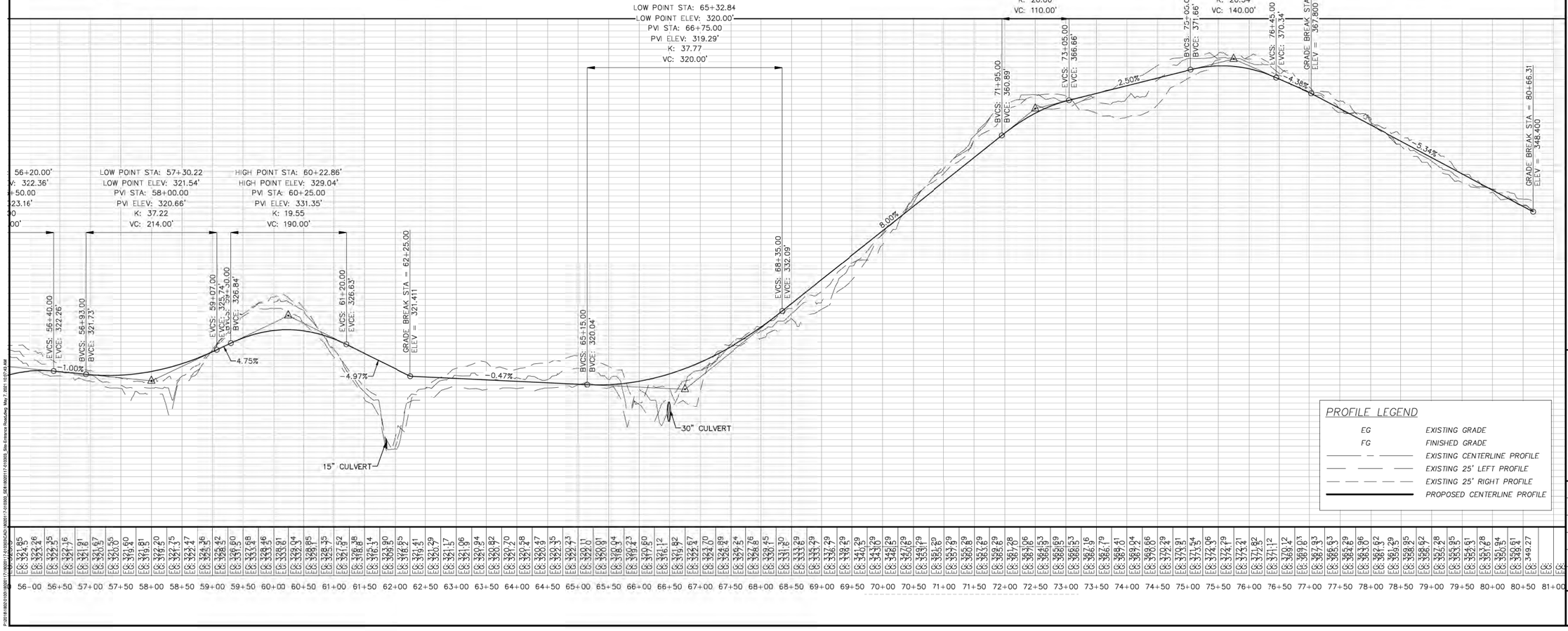
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



GRAPHIC SCALE

80 0 40 80 160

(IN FEET)
1 inch = 80ft.



PROFILE LEGEND

EG	EXISTING GRADE
FG	FINISHED GRADE
	EXISTING CENTERLINE PROFILE
	EXISTING 25' LEFT PROFILE
	EXISTING 25' RIGHT PROFILE
	PROPOSED CENTERLINE PROFILE

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REVISIONS

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6.3A

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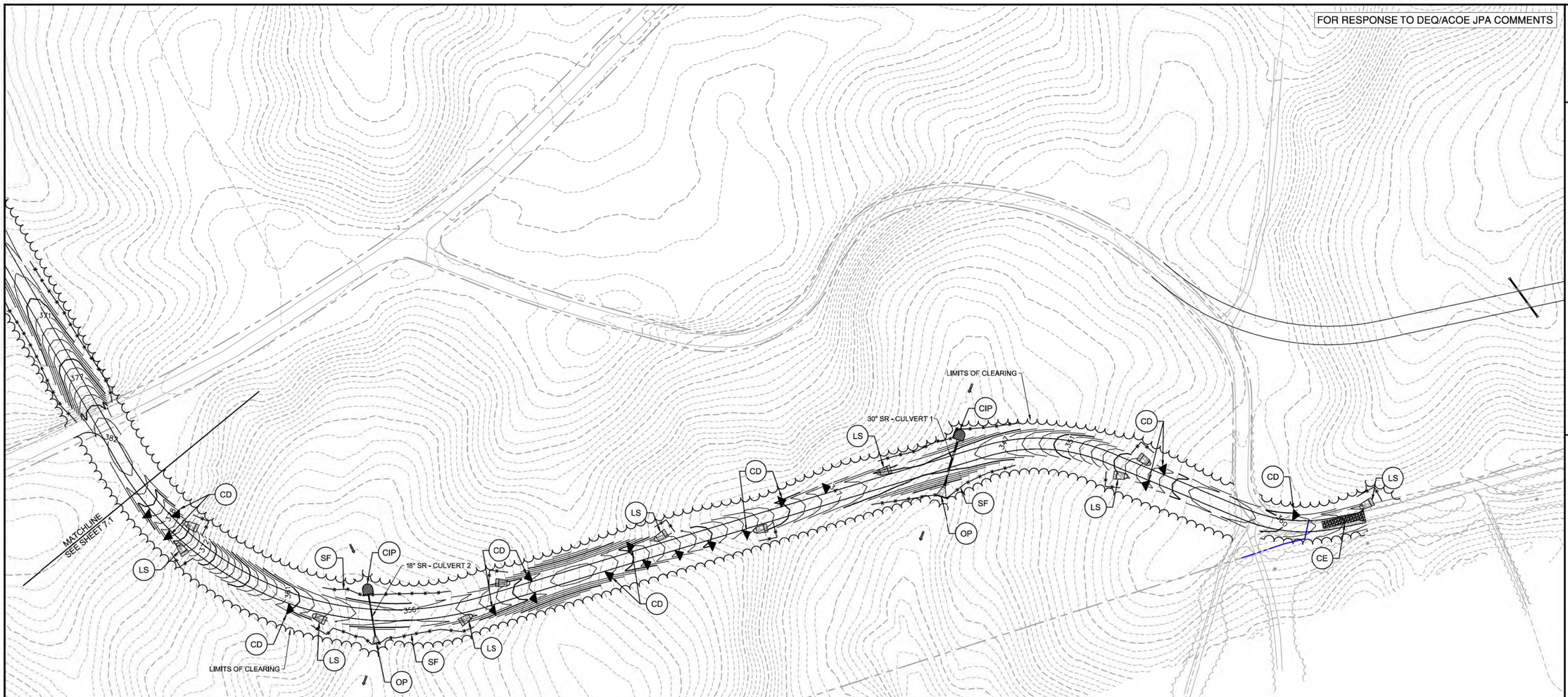
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
3.21	LEVEL SPREADER	LS	
3.31	TEMPORARY SEEDING	TS	TS
3.35	MULCHING	MU	MU
3.39	DUST CONTROL	DC	DC

GRAPHIC SCALE

80 0 40 80 160

(IN FEET)
1 inch = 80 ft.

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SECONDARY ROAD ESC PLAN
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PROJECT NUMBER:	18020117-090102

7.0

P:\2018\18020100\18020117\18020117-010000\CAD\18020117-010003_ESC_Secondary Road.dwg, May 7, 2021 10:08:33 AM

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

44CM0144
LOCATION OF INTEREST

LIMITS OF CLEARING

MATCHLINE
SEE SHEET 7.2

30" SR - CULVERT 3

LIMITS OF CLEARING

MATCHLINE
SEE SHEET 7.0

GRAPHIC SCALE
80 0 40 80 160
(IN FEET)
1 inch = 80 ft.

EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
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3.31	TEMPORARY SEEDING	TS	TS
3.35	MULCHING	MU	MU
3.39	DUST CONTROL	DC	DC

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SECONDARY ROAD ESC PLAN
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

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7.1

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FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
3.21	LEVEL SPREADER	LS	
3.31	TEMPORARY SEEDING	TS	TS
3.35	MULCHING	MU	MU
3.39	DUST CONTROL	DC	DC

44CM0134
CEMETERY

44CMC135
REVEREND'S STILL

24" SR - CULVERT 5

15" SR - CULVERT 6

30" SR - CULVERT 4

54" SR - CULVERT 7

LIMITS OF CLEARING

RR.3
PRIMARY
IMPACT

RR.4
PRIMARY
IMPACT

MATCHLINE
SEE SHEET 7.1

MAP R3

GRAPHIC SCALE
(IN FEET)
1 inch = 80 ft.

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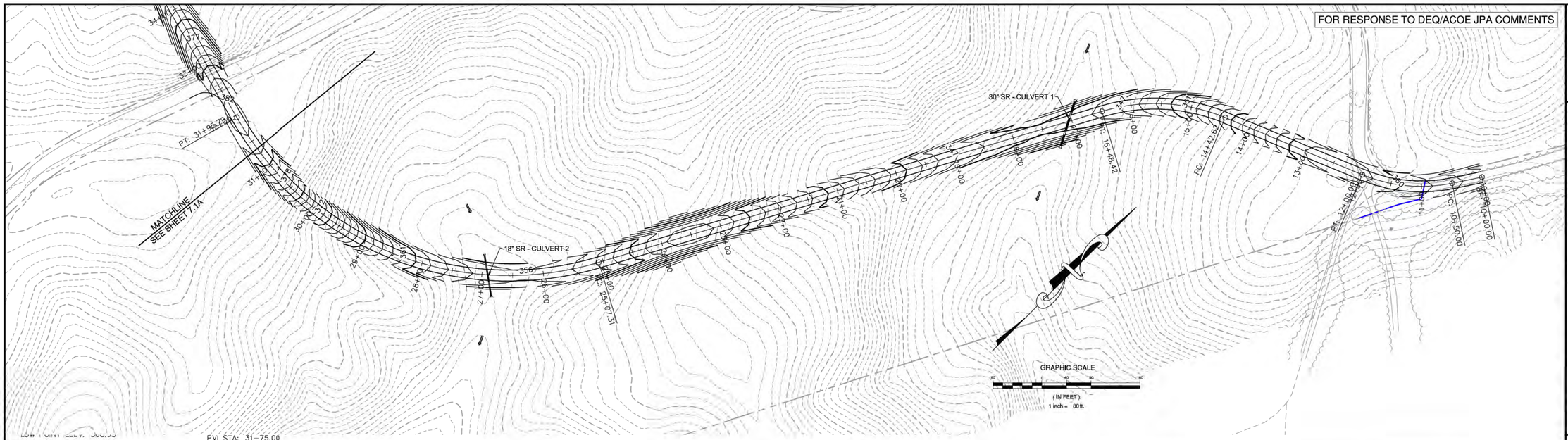
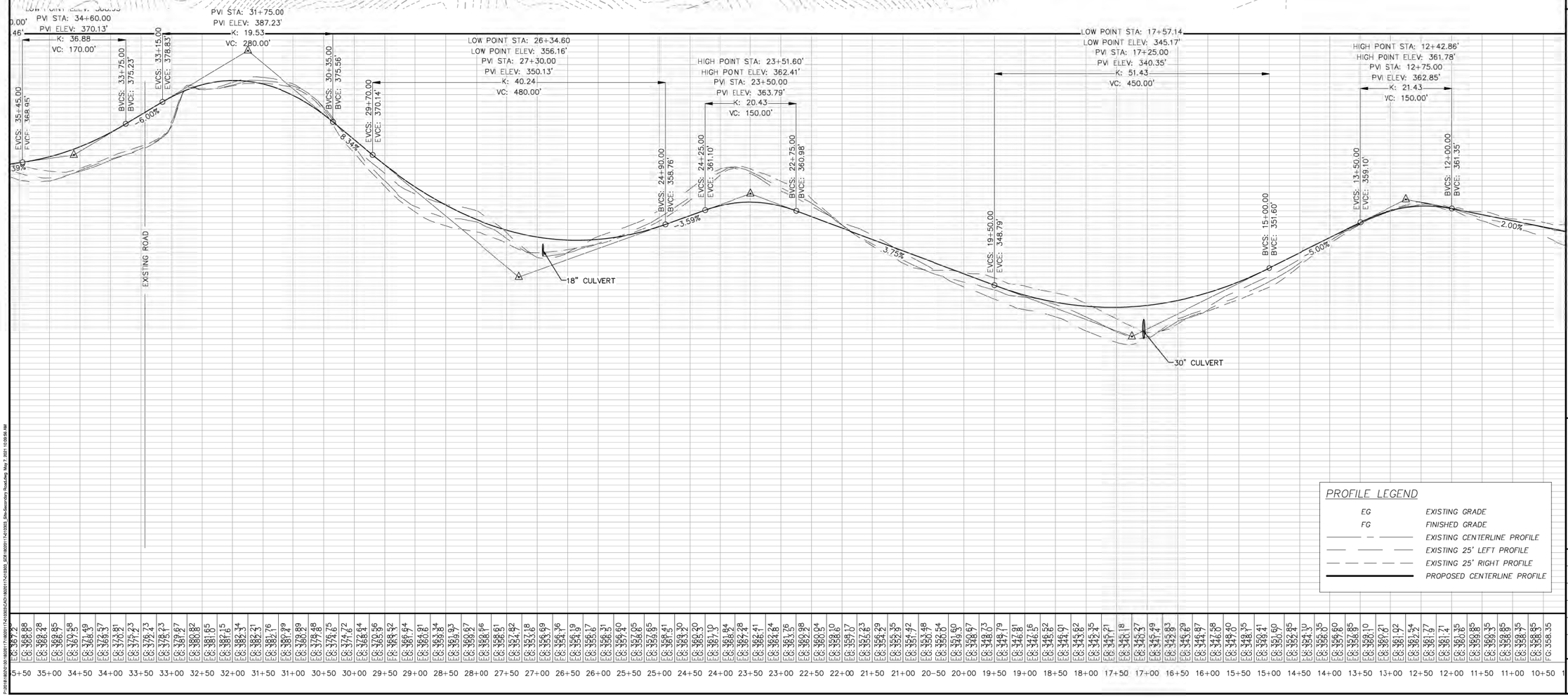
7.2

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS





PROFILE LEGEND

EG	EXISTING GRADE
FG	FINISHED GRADE
	EXISTING CENTERLINE PROFILE
	EXISTING 25' LEFT PROFILE
	EXISTING 25' RIGHT PROFILE
	PROPOSED CENTERLINE PROFILE

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7.0A

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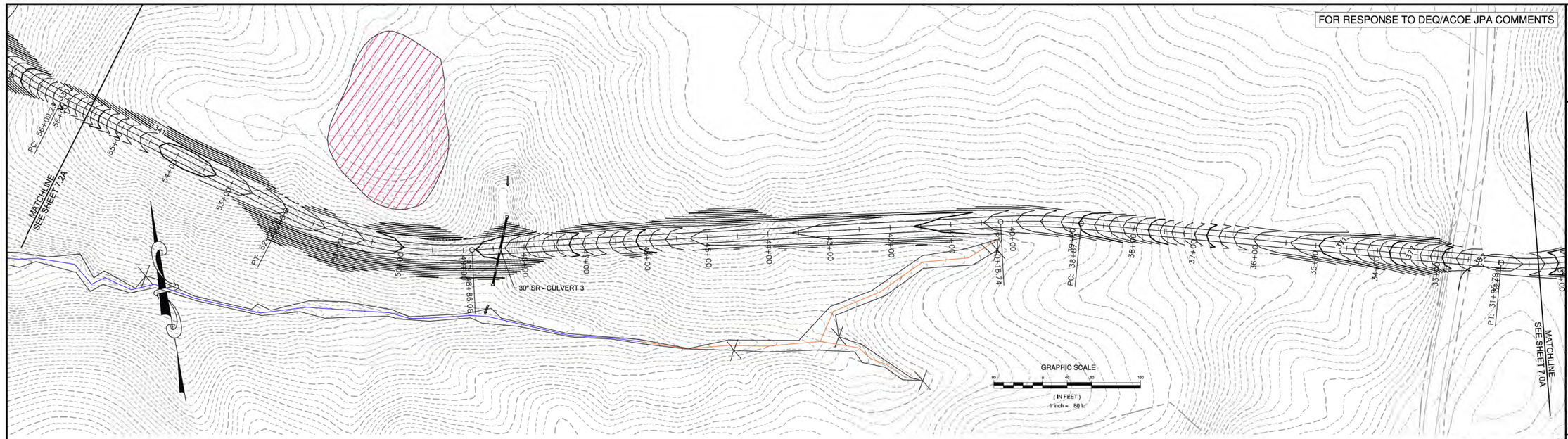
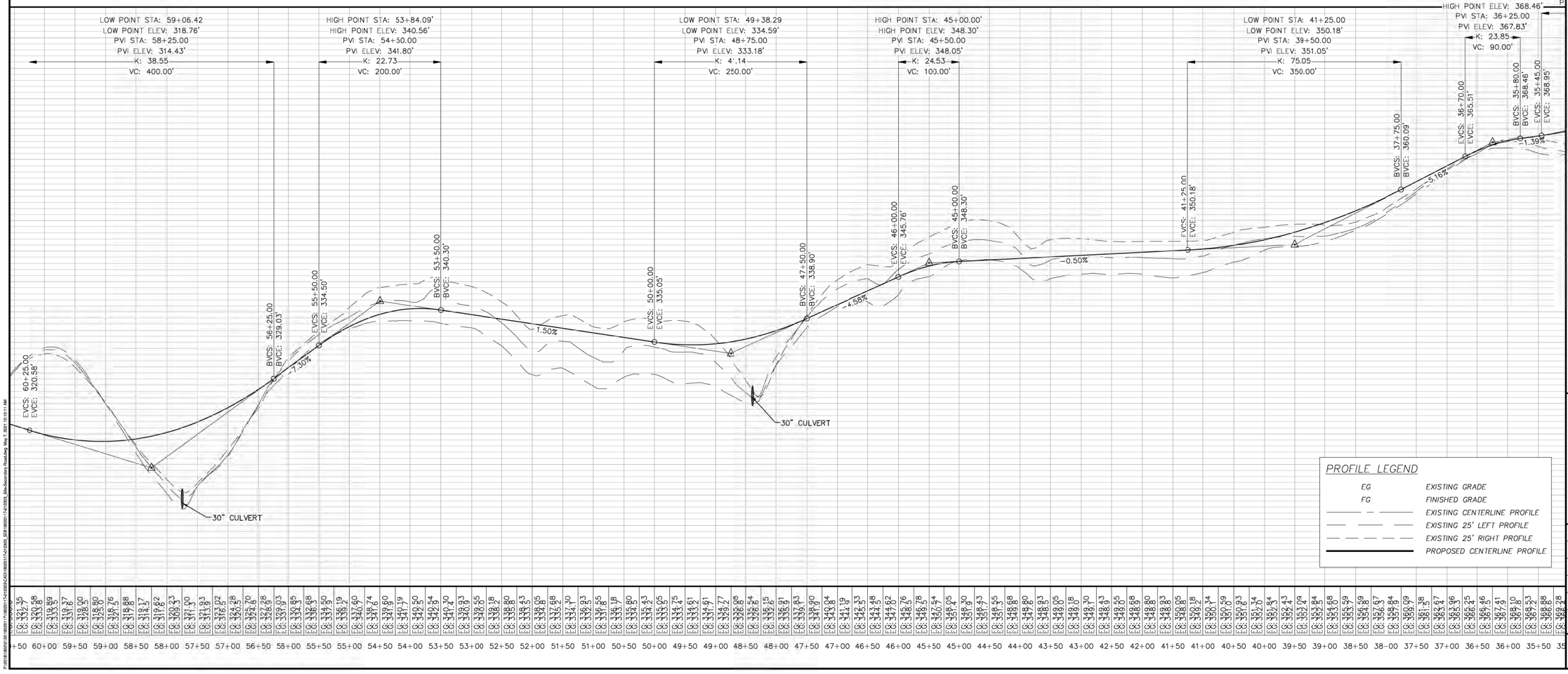
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS





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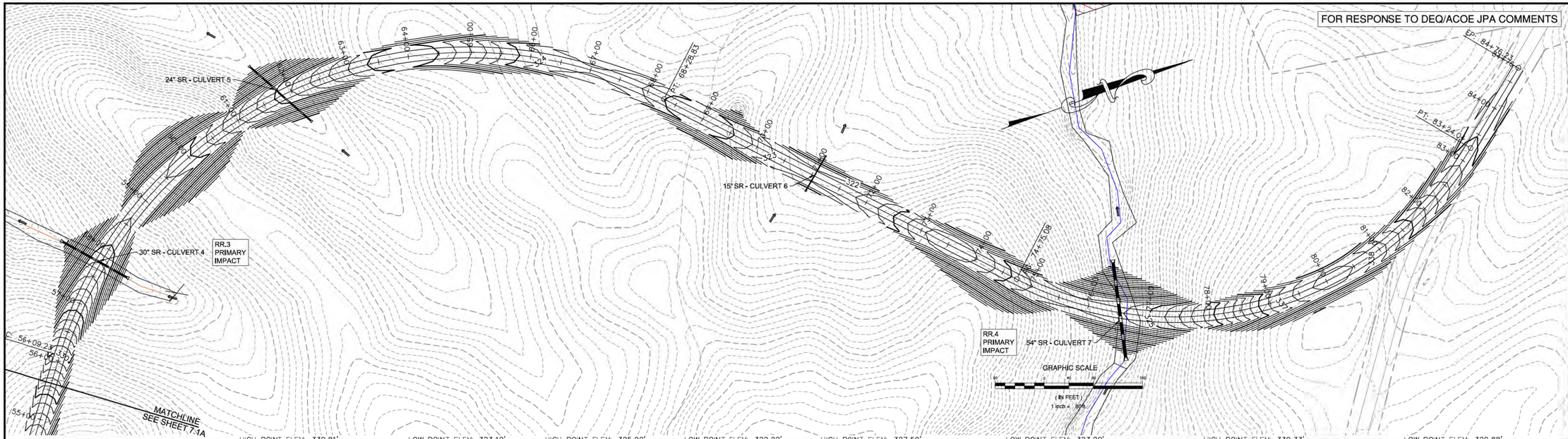
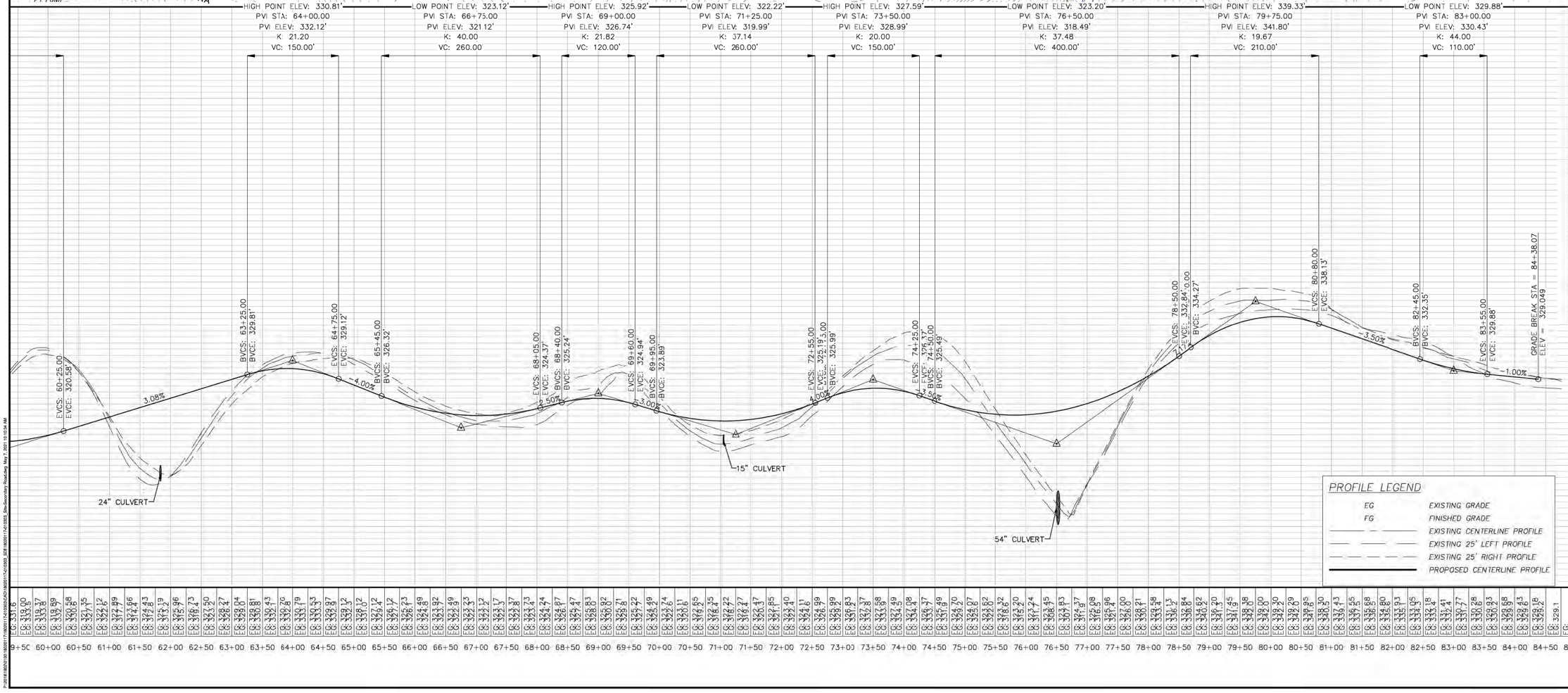
7.1A

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS





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7.2A

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FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
3.21	LEVEL SPREADER	LS	
3.31	TEMPORARY SEEDING	TS	TS
3.35	MULCHING	MU	MU
3.39	DUST CONTROL	DC	DC

NAD 83

GRAPHIC SCALE

80 0 40 80 160

(IN FEET)
1 inch = 80 ft.

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HAUL ROAD ESC PLAN
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

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CHECKED BY:	GWC
SCALE:	1" = 80'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

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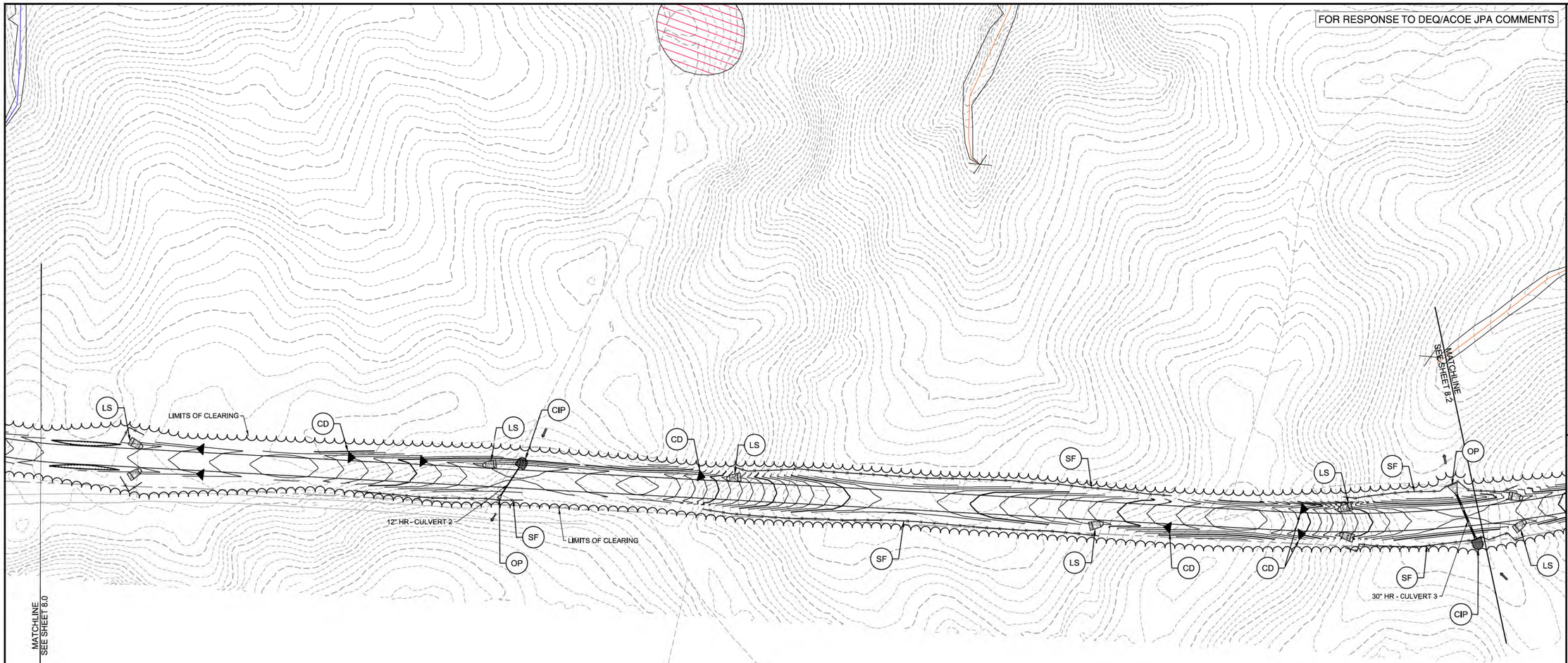
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
3.21	LEVEL SPREADER	LS	
3.31	TEMPORARY SEEDING	TS	TS
3.35	MULCHING	MU	MU
3.39	DUST CONTROL	DC	DC

NAD 83

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8.1

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FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

LIMITS OF CLEARING

SF

OP

CD

LS

CIP

30" HR - CULVERT 4

EW.5
PRIMARY
IMPACT

MATCHLINE
SEE SHEET 8.1

EROSION & SEDIMENT CONTROL LEGEND

No.	TITLE	KEY	SYMBOL
3.02	TEMPORARY STONE CONSTRUCTION ENTRANCE	CE	
3.05	SILT FENCE	SF	
3.08	CULVERT INLET PROTECTION	CIP	
3.18	OUTLET PROTECTION	OP	
3.20	ROCK CHECK DAM	CD	
3.21	LEVEL SPREADER	LS	
3.31	TEMPORARY SEEDING	TS	TS
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3.39	DUST CONTROL	DC	DC

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GRAPHIC SCALE

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HAUL ROAD ESC PLAN
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

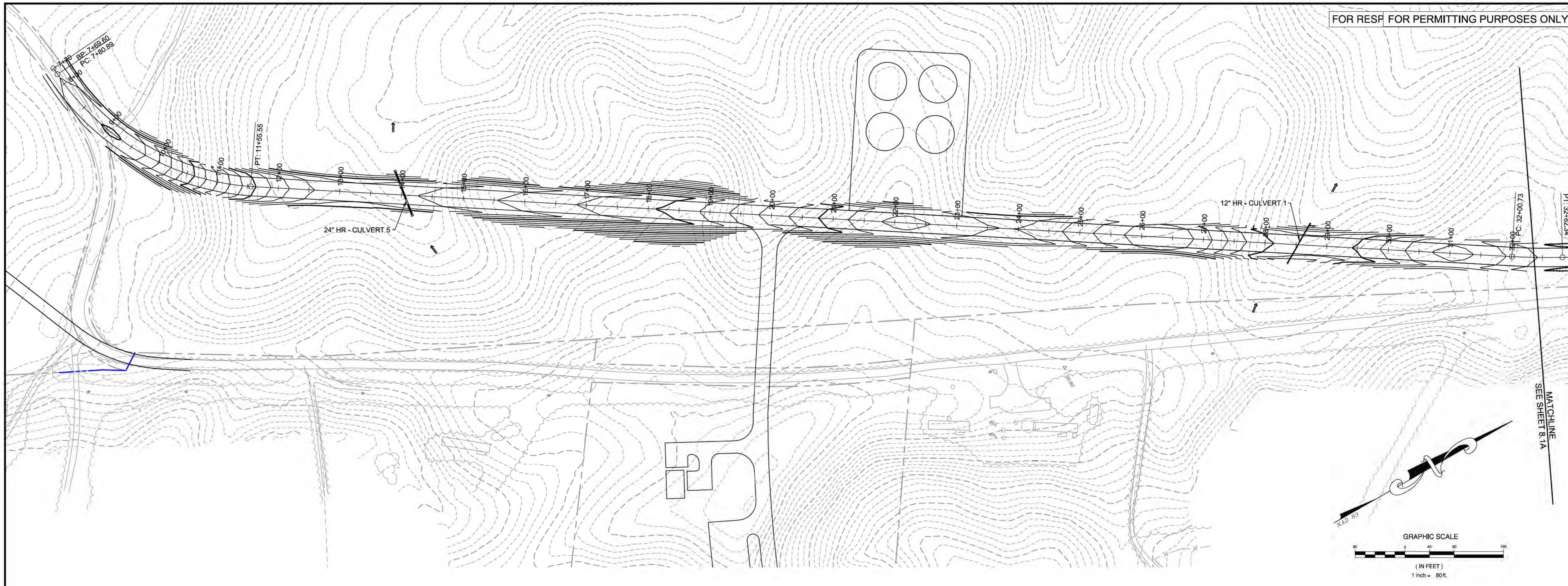
REVISIONS

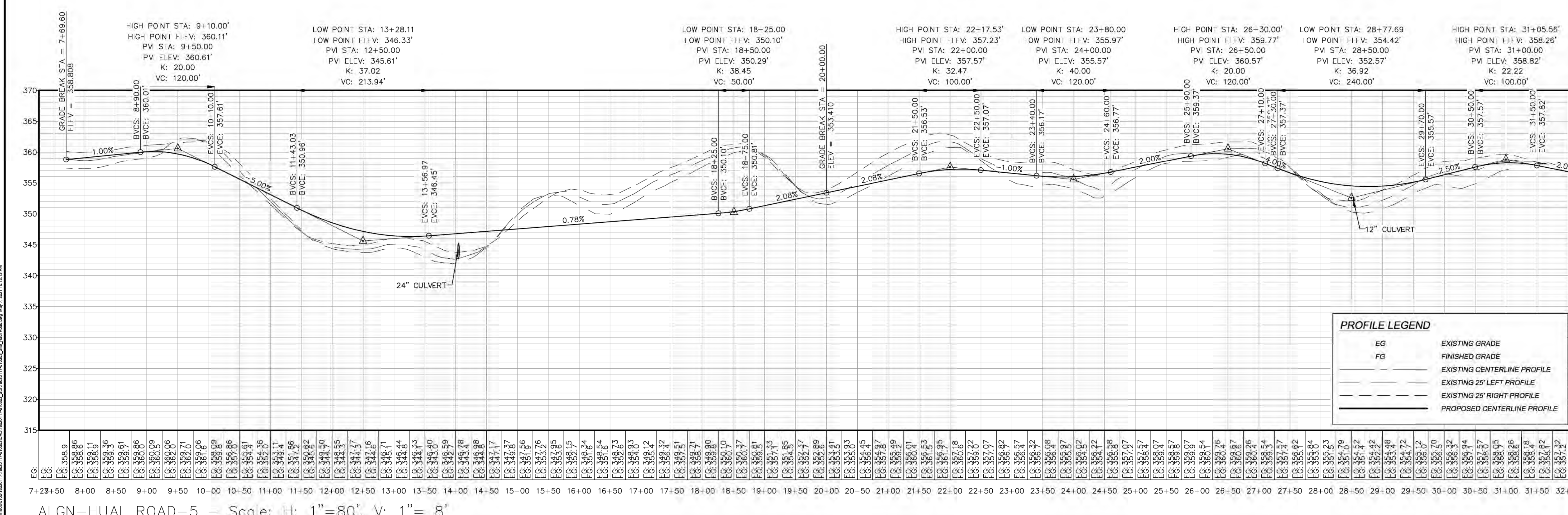
DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 80'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

8.2

P:\2018\18020\00\18020117\18020117.0100\DACAD\18020117-0100DACAD.18020117-0100_ESC_Haul Road.dwg, May 7, 2021 10:11:10 AM

FOR PERMITTING PURPOSES ONLY





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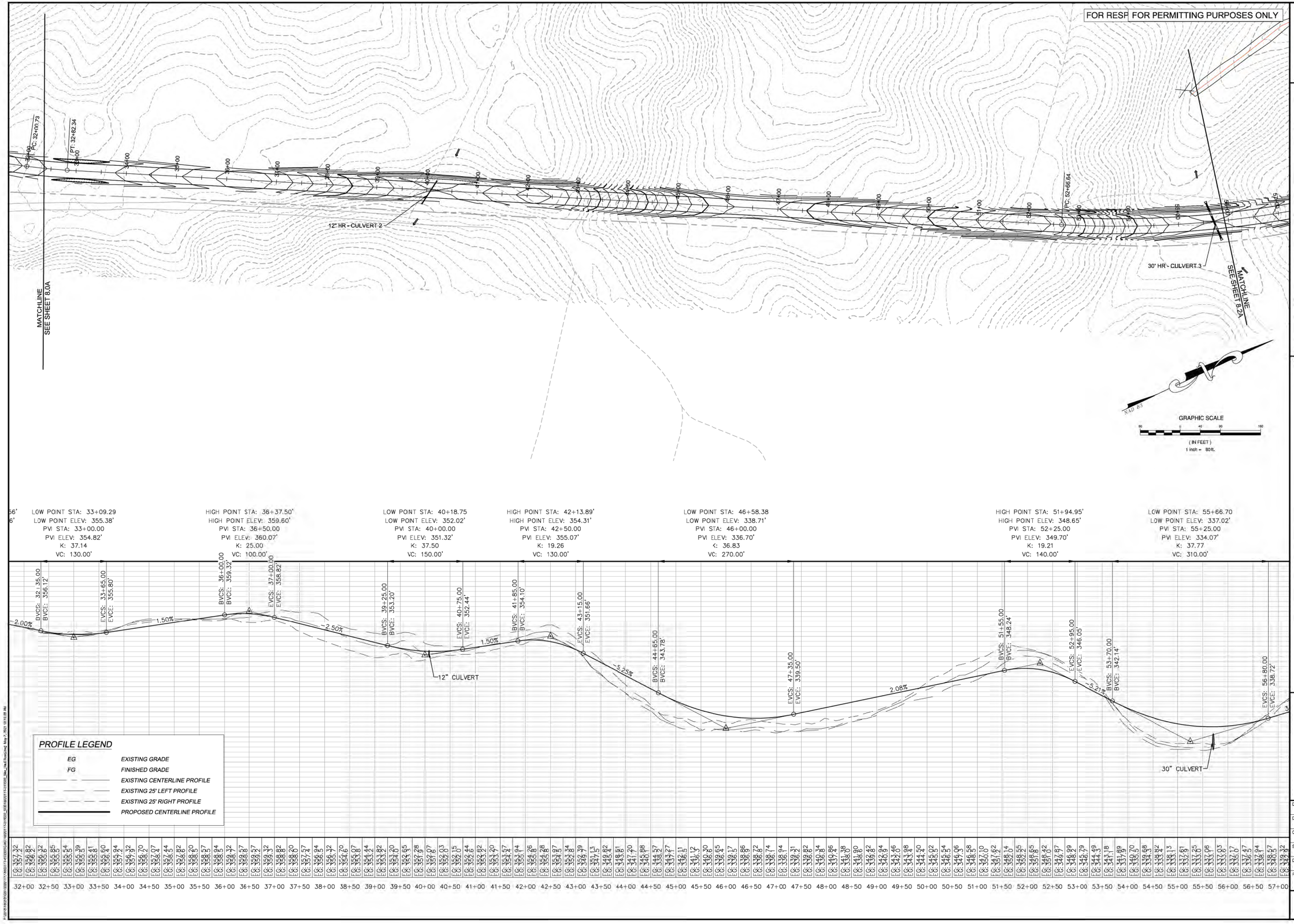
HAUL ROAD PLAN & PROFILE
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY: EEH
DRAWN BY: EEH
CHECKED BY: GWC
SCALE: 1" = 80'
DATE: APRIL 22, 2021
PROJECT NUMBER: 18020117-090102

8.0A

FOR RESP FOR PERMITTING PURPOSES ONLY



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HAUL ROAD PLAN & PROFILE
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
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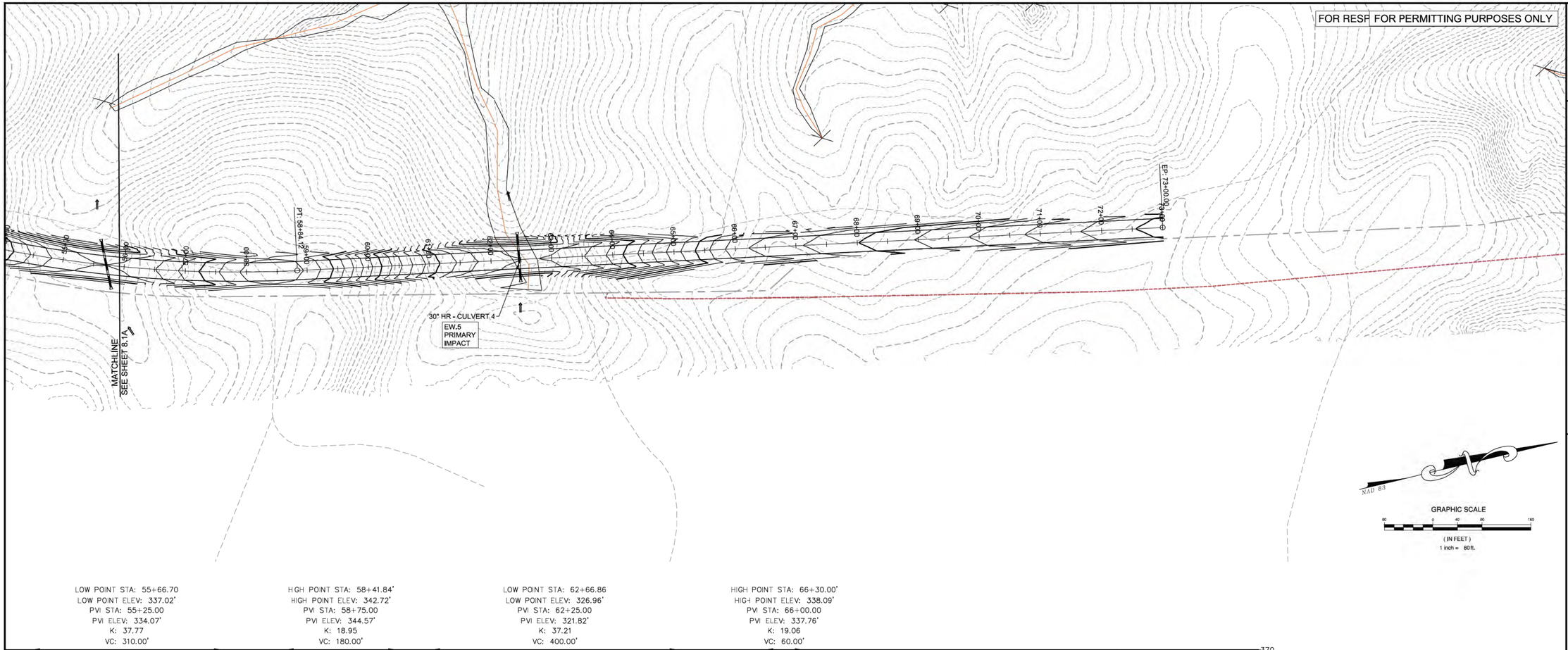
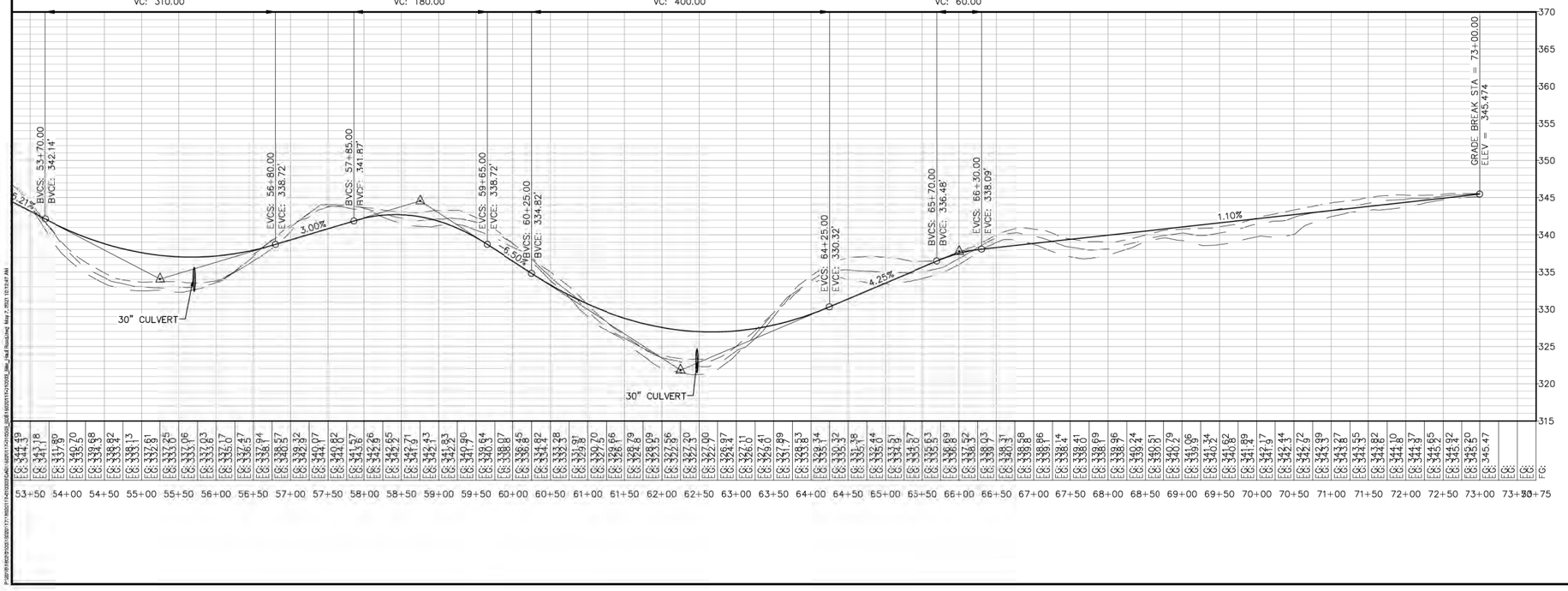
CHECKED BY:	GWC
SCALE:	1" = 80'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

8.1A

FOR RESP FOR PERMITTING PURPOSES ONLY





PROFILE LEGEND

EG	*EXISTING GRADE*
FG	*FINISHED GRADE*
	EXISTING CENTERLINE PROFILE
	EXISTING 25' LEFT PROFILE
	EXISTING 25' RIGHT PROFILE
	PROPOSED CENTERLINE PROFILE

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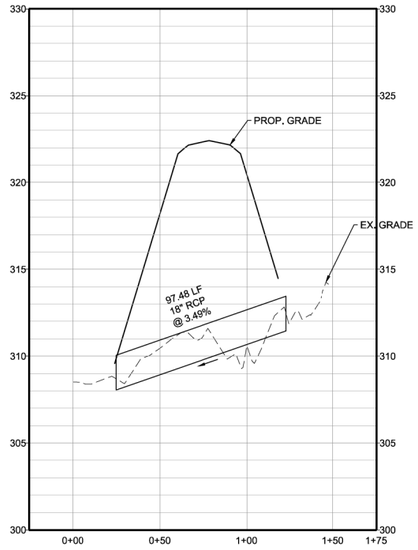
HAUL ROAD PLAN & PROFILE
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

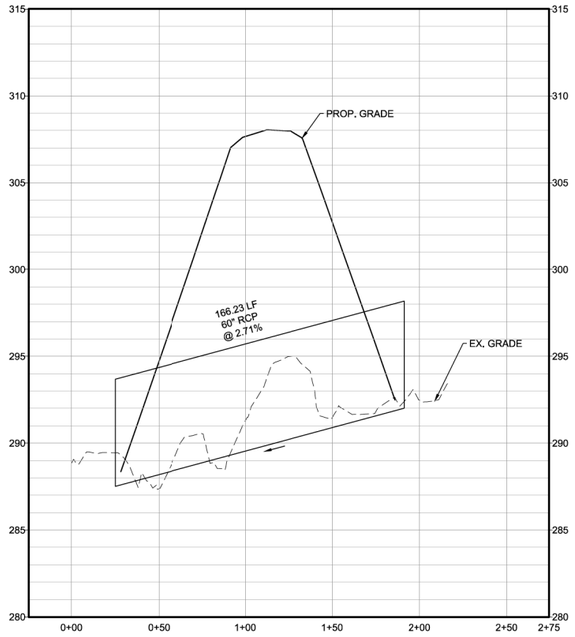
DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 80'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

8.2A

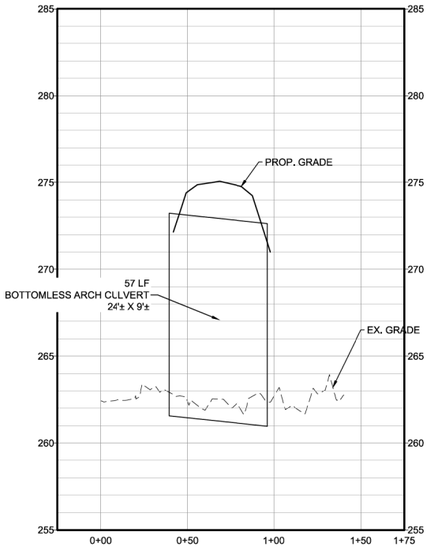
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



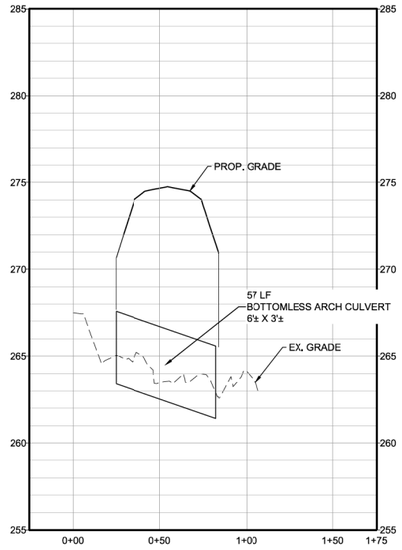
ER-CULVERT 1
Scale: H: 1"=40', V: 1"= 4'



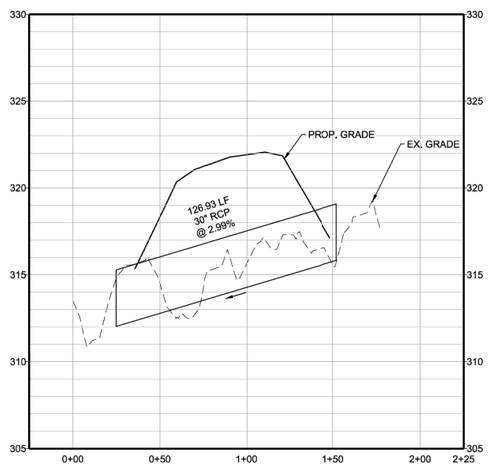
ER-CULVERT 4
Scale: H: 1"=40', V: 1"= 4'



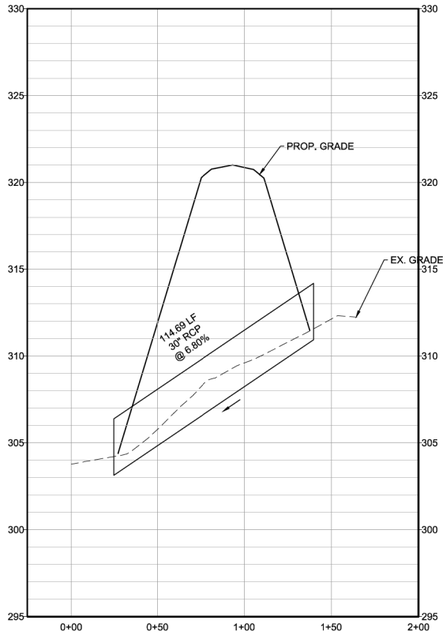
ER - BOTTOMLESS ARCH CULVERT 7A
Scale: H: 1"=40', V: 1"= 4'



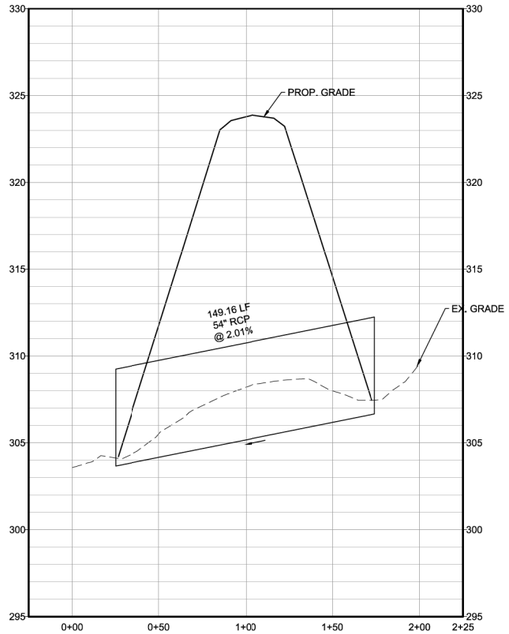
ER - BOTTOMLESS ARCH CULVERT 7B
Scale: H: 1"=40', V: 1"= 4'



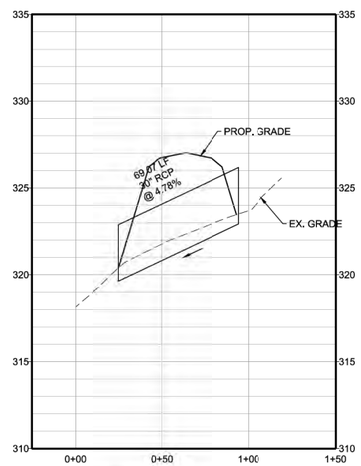
ER-CULVERT 10
Scale: H: 1"=40', V: 1"= 4'



SR-CULVERT 4
Scale: H: 1"=40', V: 1"= 4'



SR - CULVERT 7
Scale: H: 1"=40', V: 1"= 4'



HR - CULVERT 4
Scale: H: 1"=40', V: 1"= 4'

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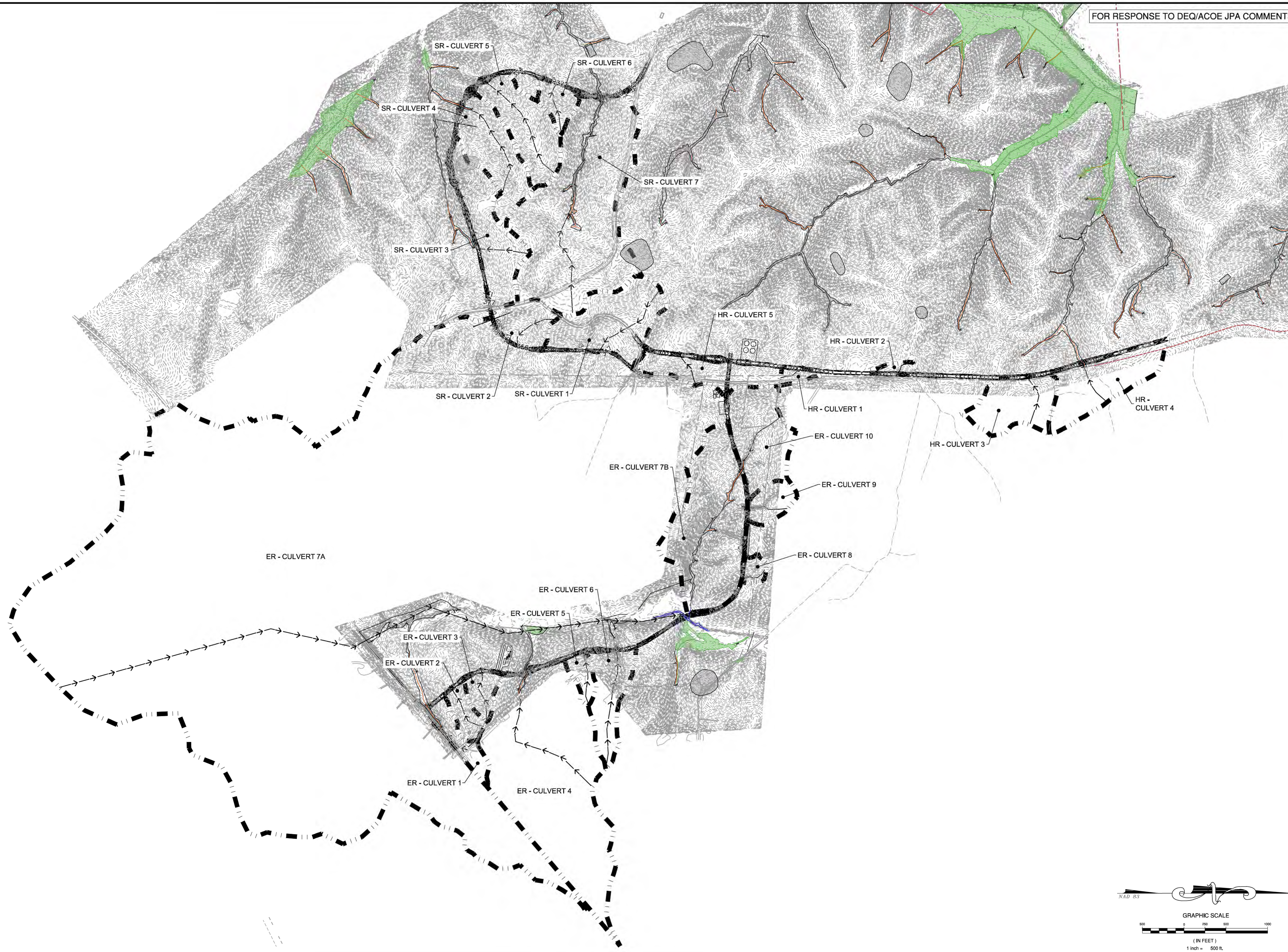
CULVERT CROSS SECTIONS
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	AS SHOWN
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

9.0

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



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CULVERT DRAINAGE AREA MAP
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 500'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

10.0

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

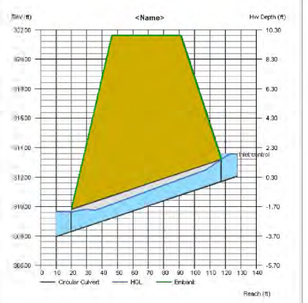
ER - CULVERT 1

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Friday, Apr 23 2021

Circular Culvert

Invert Elev Dn (ft)	= 308.30	**Calculations**	
Pipe Length (ft)	= 97.50	Qmin (cfs)	= 9.20
Slope (%)	= 3.49	Qmax (cfs)	= 9.20
Invert Elev Up (ft)	= 311.70	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 18.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 18.0	Qtotal (cfs)	= 9.20
No. Barrels	= 1	Qpipe (cfs)	= 9.20
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 5.53
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 6.21
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 309.64
		HGL Up (ft)	= 312.87
Embankment		Hw Elev (ft)	= 313.57
Top Elevation (ft)	= 321.60	Hw/D (ft)	= 1.25
Top Width (ft)	= 45.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



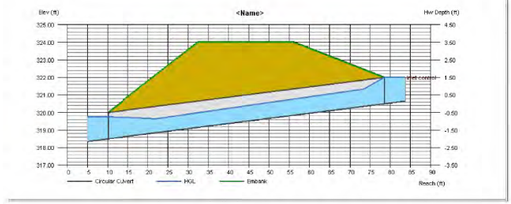
ER - CULVERT 2

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 318.50	**Calculations**	
Pipe Length (ft)	= 68.60	Qmin (cfs)	= 6.80
Slope (%)	= 2.92	Qmax (cfs)	= 6.80
Invert Elev Up (ft)	= 320.50	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 18.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 18.0	Qtotal (cfs)	= 6.80
No. Barrels	= 1	Qpipe (cfs)	= 6.80
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.31
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 5.38
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 319.75
		HGL Up (ft)	= 321.51
Embankment		Hw Elev (ft)	= 322.00
Top Elevation (ft)	= 324.00	Hw/D (ft)	= 1.00
Top Width (ft)	= 24.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



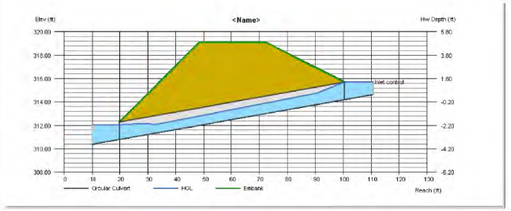
ER - CULVERT 3

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 310.80	**Calculations**	
Pipe Length (ft)	= 80.60	Qmin (cfs)	= 6.90
Slope (%)	= 4.22	Qmax (cfs)	= 6.90
Invert Elev Up (ft)	= 314.20	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 18.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 18.0	Qtotal (cfs)	= 6.90
No. Barrels	= 1	Qpipe (cfs)	= 6.90
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.36
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 5.42
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 312.06
		HGL Up (ft)	= 315.22
Embankment		Hw Elev (ft)	= 315.71
Top Elevation (ft)	= 319.10	Hw/D (ft)	= 1.01
Top Width (ft)	= 24.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



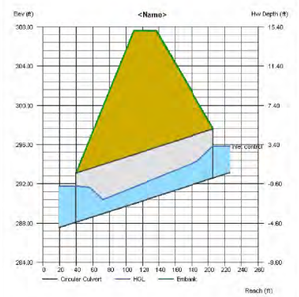
ER - CULVERT 4

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Friday, Apr 23 2021

Circular Culvert

Invert Elev Dn (ft)	= 288.10	**Calculations**	
Pipe Length (ft)	= 166.20	Qmin (cfs)	= 69.60
Slope (%)	= 2.71	Qmax (cfs)	= 69.60
Invert Elev Up (ft)	= 292.60	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 60.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 60.0	Qtotal (cfs)	= 69.60
No. Barrels	= 1	Qpipe (cfs)	= 69.60
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.50
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 7.66
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 291.78
		HGL Up (ft)	= 294.95
Embankment		Hw Elev (ft)	= 295.85
Top Elevation (ft)	= 307.60	Hw/D (ft)	= 0.65
Top Width (ft)	= 27.70	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



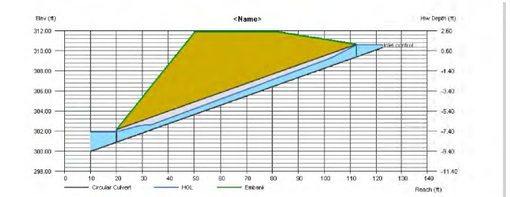
ER - CULVERT 5

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 300.90	**Calculations**	
Pipe Length (ft)	= 92.40	Qmin (cfs)	= 4.20
Slope (%)	= 9.20	Qmax (cfs)	= 4.20
Invert Elev Up (ft)	= 309.40	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 15.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 15.0	Qtotal (cfs)	= 4.20
No. Barrels	= 1	Qpipe (cfs)	= 4.20
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 3.85
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 4.86
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 301.94
		HGL Up (ft)	= 310.23
Embankment		Hw Elev (ft)	= 310.59
Top Elevation (ft)	= 311.90	Hw/D (ft)	= 0.95
Top Width (ft)	= 31.80	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



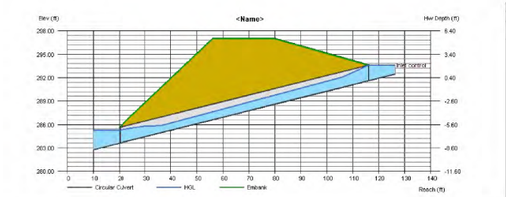
ER - CULVERT 6

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 283.60	**Calculations**	
Pipe Length (ft)	= 96.20	Qmin (cfs)	= 14.50
Slope (%)	= 8.32	Qmax (cfs)	= 14.50
Invert Elev Up (ft)	= 291.60	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 24.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 24.0	Qtotal (cfs)	= 14.50
No. Barrels	= 1	Qpipe (cfs)	= 14.50
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 5.13
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 6.32
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 285.29
		HGL Up (ft)	= 292.97
Embankment		Hw Elev (ft)	= 293.60
Top Elevation (ft)	= 297.00	Hw/D (ft)	= 1.00
Top Width (ft)	= 24.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



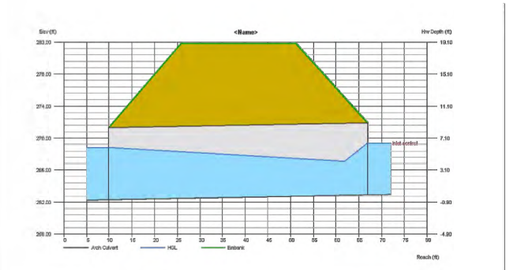
ER - CULVERT 7A

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autocesk, Inc. — Thursday, Apr 22 2021

Arch Culvert

Invert Elev Dn (ft)	= 262.30	**Calculations**	
Pipe Length (ft)	= 57.00	Qmin (cfs)	= 823.00
Slope (%)	= 1.05	Qmax (cfs)	= 823.00
Invert Elev Up (ft)	= 262.90	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 108.0		
Shape	= Arch	**Highlighted**	
Span (in)	= 216.0	Qtotal (cfs)	= 823.00
No. Barrels	= 1	Qpipe (cfs)	= 823.00
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Arch Corrugated Metal	Veloc Dn (ft/s)	= 7.76
Culvert Entrance	= 90D headwall (A)	Veloc Up (ft/s)	= 11.74
Coeff. K,M,c,Y,k	= 0.0083, 2, 0.0379, 0.69, 0.5	HGL Dn (ft)	= 268.82
		HGL Up (ft)	= 266.94
Embankment		Hw Elev (ft)	= 269.38
Top Elevation (ft)	= 281.80	Hw/D (ft)	= 0.72
Top Width (ft)	= 25.50	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



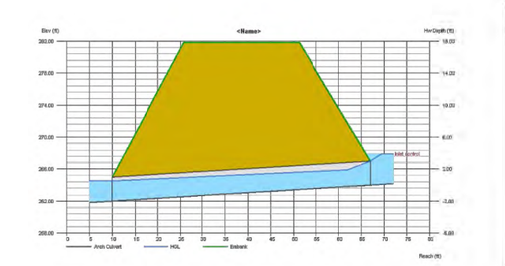
ER - CULVERT 7B

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Thursday, Apr 22 2021

Arch Culvert

Invert Elev Dn (ft)	= 262.00	**Calculations**	
Pipe Length (ft)	= 57.00	Qmin (cfs)	= 100.00
Slope (%)	= 3.51	Qmax (cfs)	= 100.00
Invert Elev Up (ft)	= 264.00	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 36.0		
Shape	= Arch	**Highlighted**	
Span (in)	= 72.0	Qtotal (cfs)	= 100.00
No. Barrels	= 1	Qpipe (cfs)	= 100.00
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Arch Corrugated Metal	Veloc Dn (ft/s)	= 7.65
Culvert Entrance	= 90D headwall (A)	Veloc Up (ft/s)	= 8.94
Coeff. K,M,c,Y,k	= 0.0083, 2, 0.0379, 0.69, 0.5	HGL Dn (ft)	= 264.52
		HGL Up (ft)	= 266.03
Embankment		Hw Elev (ft)	= 267.91
Top Elevation (ft)	= 281.80	Hw/D (ft)	= 1.30
Top Width (ft)	= 25.50	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



SEE SHEET 11.2
FOR
ER - CULVERT 8

Draper Aden Associates
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CULVERT CALCULATIONS
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 1,000'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

11.0

P:\2018\18020100\18020117\18020117-010000\CAD\18020117-010000_JDB_18020117-010000_CAL.CSLdwg May 7, 2021 10:14:10 AM

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

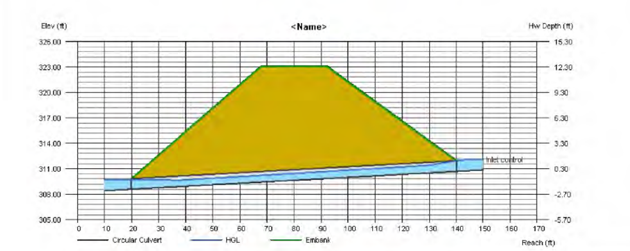
ER - CULVERT 9

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 308.60	**Calculations**	
Pipe Length (ft)	= 120.10	Qmin (cfs)	= 5.10
Slope (%)	= 1.75	Qmax (cfs)	= 5.10
Invert Elev Up (ft)	= 310.70	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 15.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 15.0	Qtotal (cfs)	= 5.10
No. Barrels	= 1	Qpipe (cfs)	= 5.10
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.52
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 5.30
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 309.68
		HGL Up (ft)	= 311.61
Embankment		Hw Elev (ft)	= 312.12
Top Elevation (ft)	= 323.10	Hw/D (ft)	= 1.13
Top Width (ft)	= 24.30	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



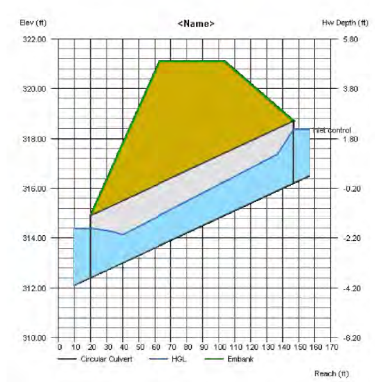
ER - CULVERT 10

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Friday, Apr 23 2021

Circular Culvert

Invert Elev Dn (ft)	= 312.40	**Calculations**	
Pipe Length (ft)	= 126.90	Qmin (cfs)	= 19.50
Slope (%)	= 2.99	Qmax (cfs)	= 19.50
Invert Elev Up (ft)	= 316.20	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 30.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 30.0	Qtotal (cfs)	= 19.50
No. Barrels	= 1	Qpipe (cfs)	= 19.50
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.64
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 6.36
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 314.40
		HGL Up (ft)	= 317.70
Embankment		Hw Elev (ft)	= 318.36
Top Elevation (ft)	= 321.10	Hw/D (ft)	= 0.86
Top Width (ft)	= 40.80	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



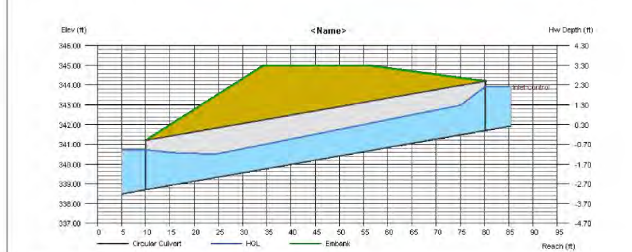
SR - CULVERT 1

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 338.70	**Calculations**	
Pipe Length (ft)	= 70.30	Qmin (cfs)	= 20.60
Slope (%)	= 4.27	Qmax (cfs)	= 20.60
Invert Elev Up (ft)	= 341.70	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 30.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 30.0	Qtotal (cfs)	= 20.60
No. Barrels	= 1	Qpipe (cfs)	= 20.60
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.85
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 6.49
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 340.72
		HGL Up (ft)	= 343.24
Embankment		Hw Elev (ft)	= 343.92
Top Elevation (ft)	= 345.00	Hw/D (ft)	= 0.89
Top Width (ft)	= 21.70	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



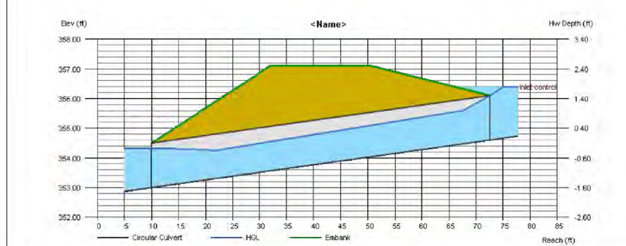
SR - CULVERT 2

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 353.00	**Calculations**	
Pipe Length (ft)	= 62.60	Qmin (cfs)	= 8.70
Slope (%)	= 2.56	Qmax (cfs)	= 8.70
Invert Elev Up (ft)	= 354.60	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 18.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 18.0	Qtotal (cfs)	= 8.70
No. Barrels	= 1	Qpipe (cfs)	= 8.70
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 5.28
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 6.03
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 354.32
		HGL Up (ft)	= 355.74
Embankment		Hw Elev (ft)	= 356.40
Top Elevation (ft)	= 357.10	Hw/D (ft)	= 1.20
Top Width (ft)	= 18.60	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



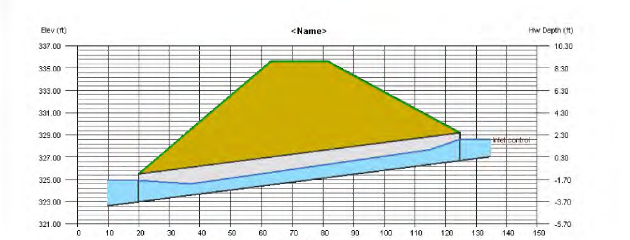
SR - CULVERT 3

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 323.00	**Calculations**	
Pipe Length (ft)	= 104.70	Qmin (cfs)	= 16.20
Slope (%)	= 3.53	Qmax (cfs)	= 16.20
Invert Elev Up (ft)	= 326.70	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 30.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 30.0	Qtotal (cfs)	= 16.20
No. Barrels	= 1	Qpipe (cfs)	= 16.20
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 3.99
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 5.95
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 324.93
		HGL Up (ft)	= 328.06
Embankment		Hw Elev (ft)	= 328.61
Top Elevation (ft)	= 335.60	Hw/D (ft)	= 0.77
Top Width (ft)	= 18.70	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



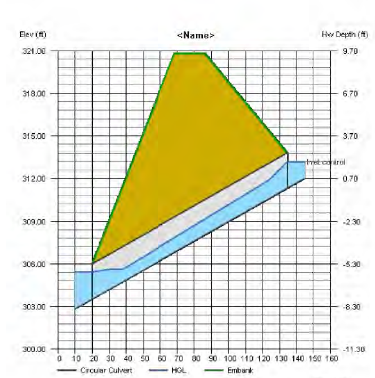
SR - CULVERT 4

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Friday, Apr 23 2021

Circular Culvert

Invert Elev Dn (ft)	= 303.50	**Calculations**	
Pipe Length (ft)	= 114.70	Qmin (cfs)	= 16.30
Slope (%)	= 6.80	Qmax (cfs)	= 16.30
Invert Elev Up (ft)	= 311.30	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 30.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 30.0	Qtotal (cfs)	= 16.30
No. Barrels	= 1	Qpipe (cfs)	= 16.30
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.01
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 5.96
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 305.43
		HGL Up (ft)	= 312.66
Embankment		Hw Elev (ft)	= 313.18
Top Elevation (ft)	= 320.80	Hw/D (ft)	= 0.75
Top Width (ft)	= 18.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



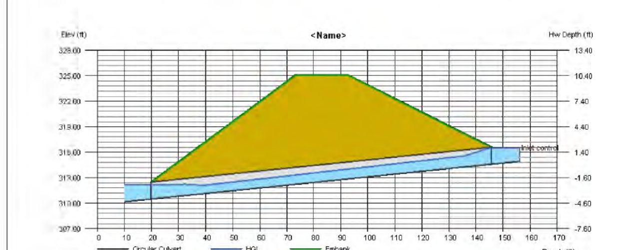
SR - CULVERT 5

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 310.50	**Calculations**	
Pipe Length (ft)	= 125.90	Qmin (cfs)	= 13.60
Slope (%)	= 3.26	Qmax (cfs)	= 13.60
Invert Elev Up (ft)	= 314.60	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 24.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 24.0	Qtotal (cfs)	= 13.60
No. Barrels	= 1	Qpipe (cfs)	= 13.60
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.87
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 6.15
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 312.16
		HGL Up (ft)	= 315.93
Embankment		Hw Elev (ft)	= 316.57
Top Elevation (ft)	= 325.10	Hw/D (ft)	= 0.98
Top Width (ft)	= 19.40	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



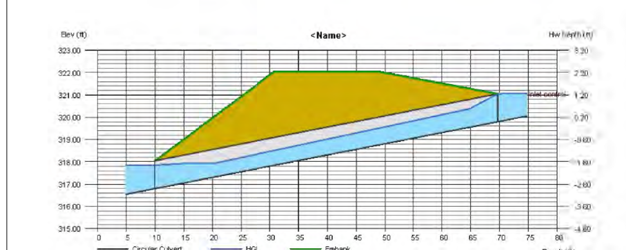
SR - CULVERT 6

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 316.80	**Calculations**	
Pipe Length (ft)	= 59.70	Qmin (cfs)	= 4.40
Slope (%)	= 5.03	Qmax (cfs)	= 4.40
Invert Elev Up (ft)	= 319.80	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 15.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 15.0	Qtotal (cfs)	= 4.40
No. Barrels	= 1	Qpipe (cfs)	= 4.40
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.00
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 4.96
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 317.85
		HGL Up (ft)	= 320.65
Embankment		Hw Elev (ft)	= 321.06
Top Elevation (ft)	= 322.05	Hw/D (ft)	= 1.01
Top Width (ft)	= 18.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



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CULVERT CALCULATIONS

GREEN RIDGE RECYCLING & DISPOSAL FACILITY

CUMBERLAND COUNTY, VIRGINIA

REVISIONS

DESIGNED BY:	EEH
DRAWN BY:	EEH
CHECKED BY:	GWC
SCALE:	1" = 1,000'
DATE:	APRIL 22, 2021
PROJECT NUMBER:	18020117-090102

11.1

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

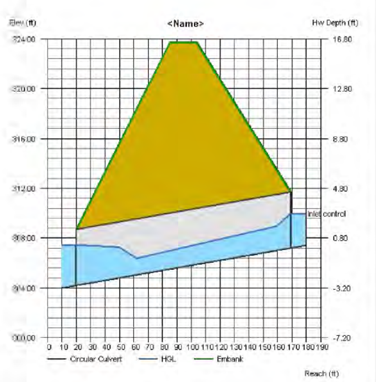
SR - CULVERT 7

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Friday, Apr 23 2021

Circular Culvert

Invert Elev Dn (ft)	= 304.20	**Calculations**	
Pipe Length (ft)	= 149.20	Qmin (cfs)	= 48.40
Slope (%)	= 2.01	Qmax (cfs)	= 48.40
Invert Elev Up (ft)	= 307.20	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 54.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 54.0	Qtotal (cfs)	= 48.40
No. Barrels	= 1	Qpipe (cfs)	= 48.40
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 3.93
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 7.04
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 307.46
		HGL Up (ft)	= 309.21
Embankment		Hw Elev (ft)	= 309.98
Top Elevation (ft)	= 323.70	Hw/D (ft)	= 0.62
Top Width (ft)	= 18.70	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



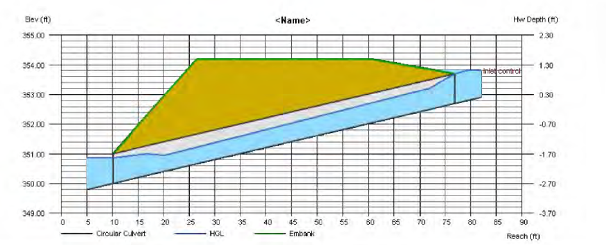
HR - CULVERT 1

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 350.00	**Calculations**	
Pipe Length (ft)	= 67.00	Qmin (cfs)	= 2.90
Slope (%)	= 4.03	Qmax (cfs)	= 2.90
Invert Elev Up (ft)	= 352.70	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 12.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 12.0	Qtotal (cfs)	= 2.90
No. Barrels	= 1	Qpipe (cfs)	= 2.90
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.02
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 4.72
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 350.86
		HGL Up (ft)	= 353.43
Embankment		Hw Elev (ft)	= 353.82
Top Elevation (ft)	= 354.20	Hw/D (ft)	= 1.12
Top Width (ft)	= 34.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



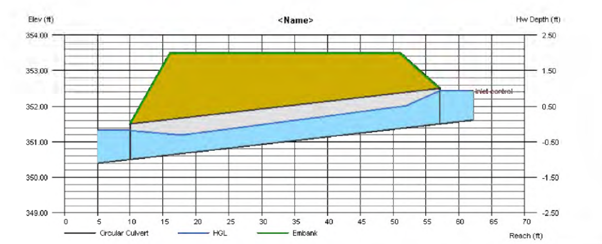
HR - CULVERT 2

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 350.50	**Calculations**	
Pipe Length (ft)	= 47.15	Qmin (cfs)	= 2.20
Slope (%)	= 2.12	Qmax (cfs)	= 2.20
Invert Elev Up (ft)	= 351.50	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 12.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 12.0	Qtotal (cfs)	= 2.20
No. Barrels	= 1	Qpipe (cfs)	= 2.20
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 3.20
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 4.19
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 351.32
		HGL Up (ft)	= 352.13
Embankment		Hw Elev (ft)	= 352.43
Top Elevation (ft)	= 353.50	Hw/D (ft)	= 0.93
Top Width (ft)	= 35.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



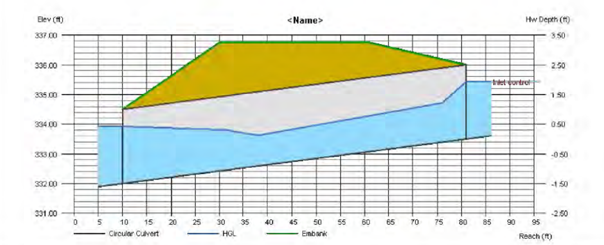
HR - CULVERT 3

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 332.00	**Calculations**	
Pipe Length (ft)	= 71.00	Qmin (cfs)	= 16.20
Slope (%)	= 2.11	Qmax (cfs)	= 16.20
Invert Elev Up (ft)	= 333.50	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 30.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 30.0	Qtotal (cfs)	= 16.20
No. Barrels	= 1	Qpipe (cfs)	= 16.20
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 3.99
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 5.95
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 333.93
		HGL Up (ft)	= 334.86
Embankment		Hw Elev (ft)	= 335.43
Top Elevation (ft)	= 336.75	Hw/D (ft)	= 0.77
Top Width (ft)	= 31.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



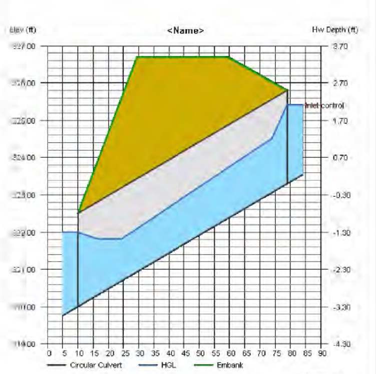
HR - CULVERT 4

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Friday, Apr 23 2021

Circular Culvert

Invert Elev Dn (ft)	= 320.00	**Calculations**	
Pipe Length (ft)	= 69.00	Qmin (cfs)	= 19.20
Slope (%)	= 4.78	Qmax (cfs)	= 19.20
Invert Elev Up (ft)	= 323.30	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 30.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 30.0	Qtotal (cfs)	= 19.20
No. Barrels	= 1	Qpipe (cfs)	= 19.20
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.58
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 6.32
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 321.99
		HGL Up (ft)	= 324.78
Embankment		Hw Elev (ft)	= 325.41
Top Elevation (ft)	= 326.70	Hw/D (ft)	= 0.85
Top Width (ft)	= 30.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



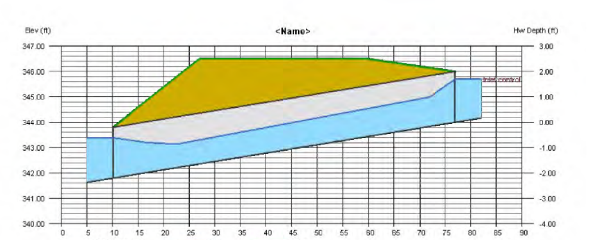
HR - CULVERT 5

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 341.80	**Calculations**	
Pipe Length (ft)	= 67.00	Qmin (cfs)	= 10.90
Slope (%)	= 3.28	Qmax (cfs)	= 10.90
Invert Elev Up (ft)	= 344.00	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 24.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 24.0	Qtotal (cfs)	= 10.90
No. Barrels	= 1	Qpipe (cfs)	= 10.90
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 4.07
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 5.64
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 343.39
		HGL Up (ft)	= 345.18
Embankment		Hw Elev (ft)	= 345.70
Top Elevation (ft)	= 346.50	Hw/D (ft)	= 0.85
Top Width (ft)	= 33.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



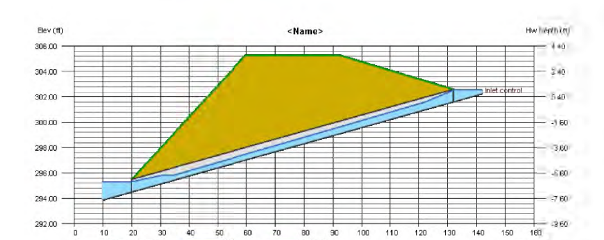
ER - CULVERT 8

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Tuesday, Mar 30 2021

Circular Culvert

Invert Elev Dn (ft)	= 294.50	**Calculations**	
Pipe Length (ft)	= 112.00	Qmin (cfs)	= 2.30
Slope (%)	= 6.34	Qmax (cfs)	= 2.30
Invert Elev Up (ft)	= 301.60	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 12.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 12.0	Qtotal (cfs)	= 2.30
No. Barrels	= 1	Qpipe (cfs)	= 2.30
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Concrete	Veloc Dn (ft/s)	= 3.32
Culvert Entrance	= Groove end projecting (C)	Veloc Up (ft/s)	= 4.27
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.2	HGL Dn (ft)	= 295.32
		HGL Up (ft)	= 302.25
Embankment		Hw Elev (ft)	= 302.54
Top Elevation (ft)	= 305.30	Hw/D (ft)	= 0.94
Top Width (ft)	= 32.40	Flow Regime	= Inlet Control
Crest Width (ft)	= 0.00		



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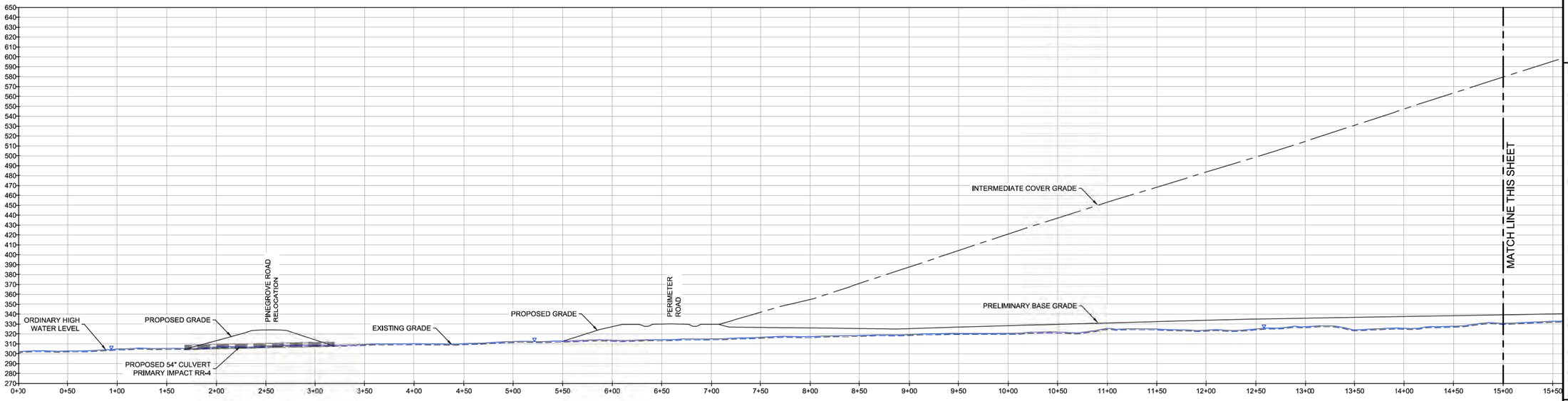
CULVERT CALCULATIONS
GREEN RIDGE RECYCLING & DISPOSAL FACILITY
CUMBERLAND COUNTY, VIRGINIA

REVISIONS

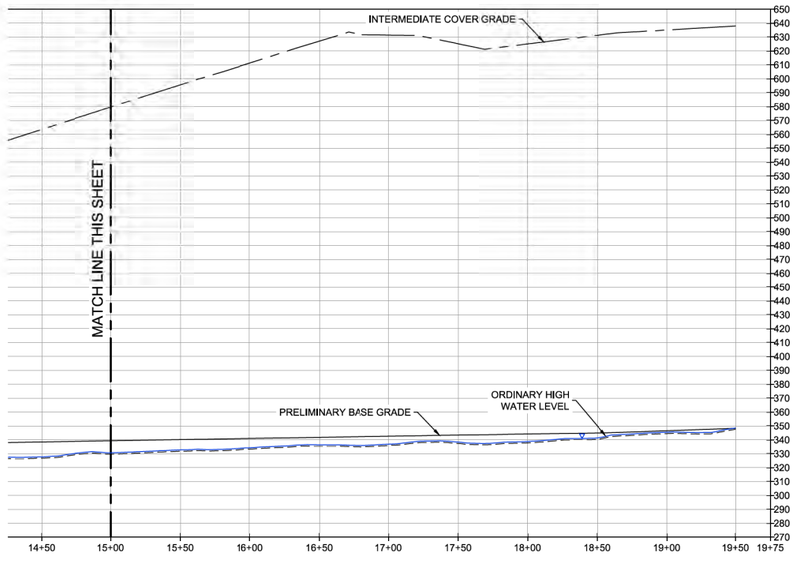
DESIGNED BY: EEH
DRAWN BY: EEH
CHECKED BY: GWC
SCALE: 1" = 1,000'
DATE: APRIL 22, 2021
PROJECT NUMBER: 18020117-090102

11.2

FOR RESPONSE TO DEQ/ACOE JPA COMMENTS



STREAM PROFILE - Scale: H: 1"=50', V: 1:1



GRAPHIC SCALE

50 0 25 50 100

(IN FEET)

1 inch = 50 ft.

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STREAM PROFILES AND CROSS SECTIONS
EXISTING - BASE - INTERMEDIATE COVER GRADES
STREAM SECTION - STREAM REACH 1 - IMPACT SHEET C1.1

GREEN RIDGE RECYCLING & DISPOSAL FACILITY

CUMBERLAND COUNTY, VIRGINIA

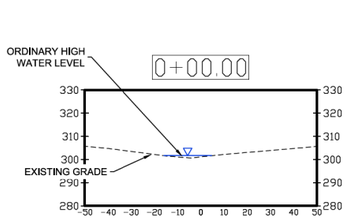
REVISIONS

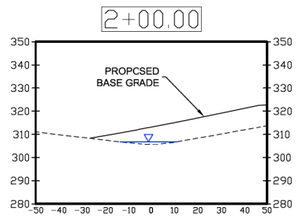
DESIGNED BY:	AST
DRAWN BY:	DLD
CHECKED BY:	LPK
SCALE:	1" = 50'
DATE:	MARCH 19, 2021
PROJECT NUMBER:	18020117-090102

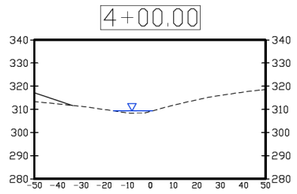
1

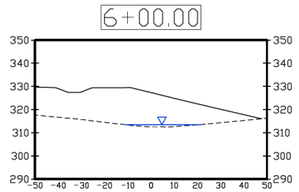
P:\2018\18020100\18020117\19100\CAD\GREENRIDGE WESTERN SET_JPA PROFILES.dwg, May 7, 2021 10:14:08 AM

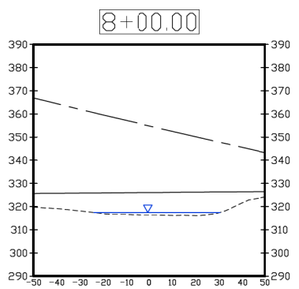
FOR RESPONSE TO DEQ/ACOE JPA COMMENTS

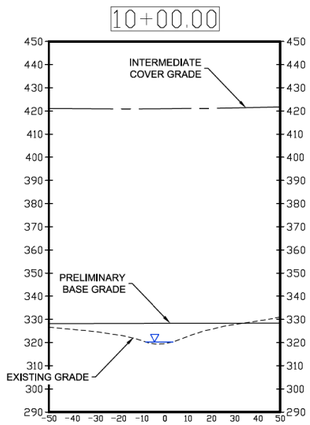


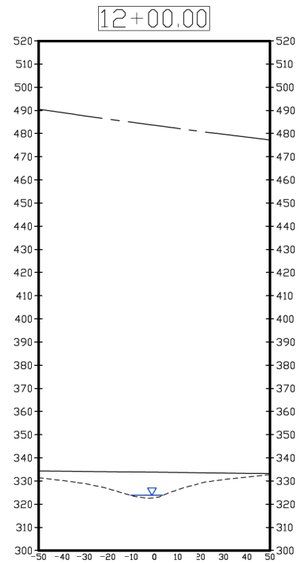


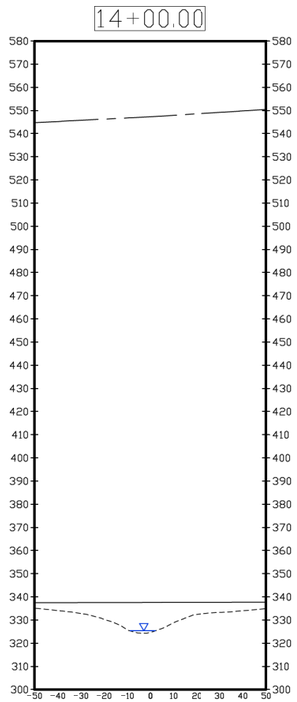


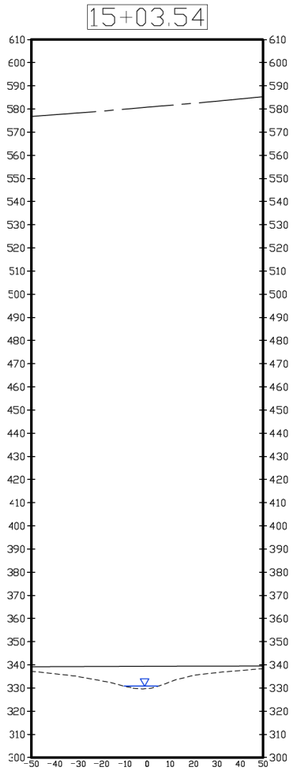












GRAPHIC SCALE
(IN FEET)
1 inch = 30ft.

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2

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WORK IN PROGRESS - NOT FOR DISTRIBUTION